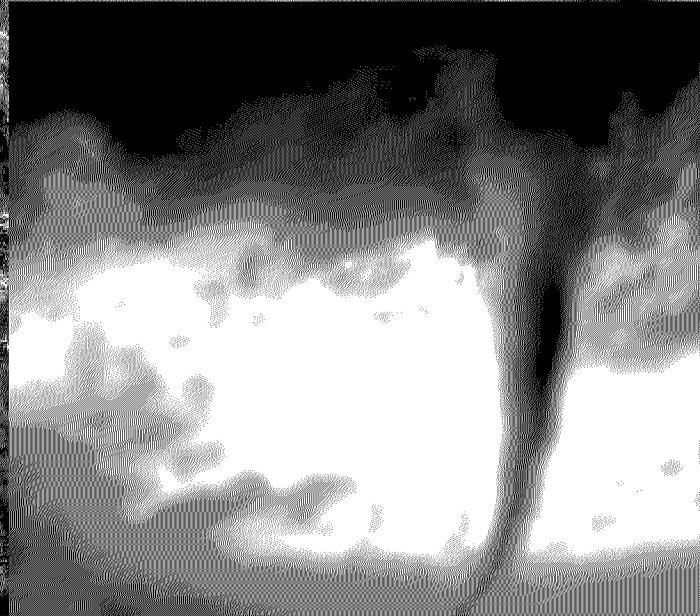
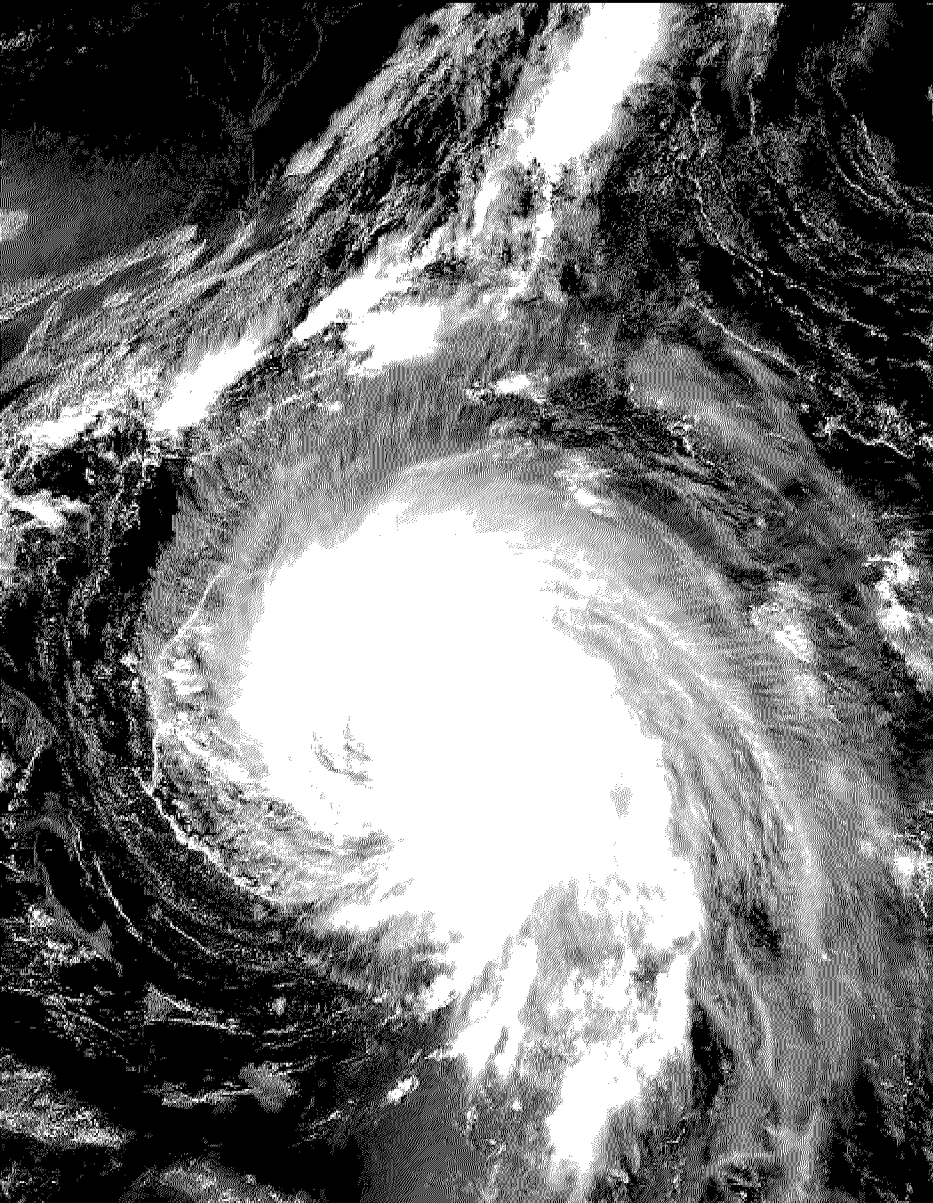


December 2014



City of Sugar Land, Texas

Hazard Mitigation Plan

CITY OF SUGAR LAND HAZARD MITIGATION PLAN

The plan was prepared under the direction of the City of Sugar Land Hazard Mitigation Planning Committee. For additional information, please contact the City of Sugar Land Department of Emergency Management.

Patrick K. Hughes, TEM, EMC

Department Director

Sugar Land Department of Emergency Management

2700 Town Center Blvd. North

Sugar Land, Texas 77478

phughes@sugarlandtx.gov

Work (281) 275-2860

Fax (281) 275-2336

Cell (281) 757-2526

EXECUTIVE SUMMARY

Mitigation should form the foundation of every emergency management agency's plans and procedures. Emergency management agencies must adopt mitigation practices to reduce, minimize, or eliminate hazards in their community. The City of Sugar Land Hazard Mitigation Plan (HMP) identifies the hazards faced in the community, certain vulnerabilities to these hazards, and mitigation strategies for the future. The plan fulfills the requirements of the Federal Disaster Mitigation Act as administered by the Texas Division of Emergency Management and the Federal Emergency Management Agency.

Employees and citizens from the City of Sugar Land attended public meetings to discuss the hazards their community faces and the vulnerabilities those hazards present. Representatives from each participating Sugar Land department reviewed drafts of the HMP and added input to the mitigation strategies presented in the plan. City of Sugar Land citizens were also active participants in the development of the plan. Citizens attended public meetings that were advertised online and in news articles to share their concerns about hazards faced in the community and how to mitigate the effects of these hazards.

The City of Sugar Land understands the benefits of developing and implementing mitigation plans and strategies. Elected officials, public safety organizations, planners, private entities, and many others have worked together to develop and implement this HMP, proving that they have the vision to implement mitigation practices and therefore reduce the loss of life and property in their community.

Hazard Analysis

The process of developing the City of Sugar Land HMP began with a review of the hazards faced in the community. The below ranking of hazards was conducted by assigning a score to each hazard based on the frequency of the hazard, impact potential, severity of damage, and overall economic disruption. Several hazards received the same score. The City of Sugar Land Hazard Mitigation Planning Committee (HMPC) discussed those hazards in which the score was tied and determined the order in which the hazards should be ranked.

Hazard	Frequency of Occurrence	Warning Time	Geographic Extent	Potential Impact	Hazard Score	Vulnerable Critical Facilities	Economic Disruption
Tornadoes	Likely	None-Minimal	Community-wide	Major	13	Communications, schools, medical care facilities, hospital, water/sewer/electric, transportation infrastructure, businesses, residential homes	Utility lines down, medical care disruption, transportation routes impaired
Severe Thunderstorms	Highly Likely	3-6 hours	Community-wide	Moderate	12	Communications, schools, medical care facilities, hospital,	Utility systems disrupted, business and residential

EXECUTIVE SUMMARY

Hazard	Frequency of Occurrence	Warning Time	Geographic Extent	Potential Impact	Hazard Score	Vulnerable Critical Facilities	Economic Disruption
Flooding	Likely	3 – 6 Hours	Community-wide	Major	12	water/sewer/electric, transportation infrastructure Communications infrastructure, transportation infrastructure, medical care facilities, hospitals, schools, businesses, residential homes	impact, hail damage to crops, roads damaged/closed Businesses, roads damaged/closed, utilities affected Agriculture, business and residential impact, fire suppression Business/industry impact, health care system impact, and communications impact
Drought	Likely	More than 12 hours	Countywide	Moderate - Major	11	Agri-business	
Hurricanes/Tropical Storms	Likely	More than 12 hours	Countywide	Major	11	Communications infrastructure, utility infrastructure Communications infrastructure, transportation infrastructure, medical care facilities, hospitals, schools, businesses, residential homes	Business/industry and residential impact, evacuation, environmental impact
Hazardous Materials Spills	Likely	None-Minimal	Localized - Community Wide	Moderate	11	Communications infrastructure, transportation infrastructure, medical care facilities, hospitals, schools, businesses, residential homes	Utility systems disrupted, business and residential impact, evacuations, roads damaged/closed Utility systems disrupted, business and residential impact, hail damage to crops, roads damaged/closed
Terrorism	Unlikely	None-Minimal	Community-wide	Major	11	Communications, schools, medical care facilities, hospital, water/sewer/electric, transportation infrastructure	
Hailstorms	Likely	3-6 Hours	Community-wide	Minor	10		

Hazard	Frequency of Occurrence	Warning Time	Geographic Extent	Potential Impact	Hazard Score	Vulnerable Critical Facilities	Economic Disruption
Dam and Levee Failure	Unlikely	3-6 Hours	Community-wide	Major	10	Communications infrastructure, transportation infrastructure, medical care facilities, hospitals, schools, businesses, residential homes	Businesses, roads damaged/closed, utilities affected
Energy or Fuel Shortage	Unlikely	None-Minimal	Countywide	Minor	10	Communications infrastructure, transportation infrastructure, medical care facilities, hospitals, schools, businesses, residential homes	Business and residential impact
Severe winter storms	Likely	More than 12 hours	Countywide	Minor	9	Communications infrastructure, transportation infrastructure, medical care facilities, hospitals, schools, businesses, residential homes	Utility lines down, livestock threatened
Lightening Aircraft/Transportation Accidents	Occasionally	None	Localized	Minor	9	Medical care facilities, elderly care facilities	Utility systems disrupted, business and residential impact, roads damaged/closed
	Unlikely	None	Localized	Minor - Moderate	8	Businesses/residential homes	Business/industry impact
Extreme Temperatures	Occasionally	More than 12 hours	Countywide	Negligible	7	Medical care facilities, elderly care facilities	Businesses, roads damaged/closed, utilities affected

CITY OF SUGAR LAND HAZARD MITIGATION PLAN

Table of Contents

Table of Contents

List of Tables

CITY OF SUGAR LAND HAZARD MITIGATION PLAN	1
EXECUTIVE SUMMARY	1
PREFACE	1
Section 1 PLAN, BACKGROUND, AND PURPOSE.....	1-1
1.1 Overview	1-1
1.2 Authority	1-1
1.3 Scope.....	1-1
1.4 Purpose.....	1-2
1.5 Consistency with Federal and State Mitigation Policies	1-2
1.6 Goals and Objectives	1-3
Section 2 COMMUNITY PROFILE	2-1
2.1 Overview	2-1
2.2 Demographics.....	2-2
2.3 Economy	2-6
2.4 Climate.....	2-6
2.5 Land Use	2-7
2.5.1 Current Land Use	2-7
2.5.2 Future Land Use.....	2-10
2.5.3 Watersheds.....	2-12
2.5.4 Transportation.....	2-15
2.5.5 Trucking Traffic.....	2-16
2.5.6 Rail	2-17
2.5.7 Airports.....	2-18
2.5.8 Transit.....	2-20
2.6 Sugar Land Capabilities	2-20
2.6.1 Legal and Regulatory Capabilities	2-20
2.6.2 Staffing Capabilities	2-21
2.6.3 Fiscal Capabilities	2-23
2.6.4 Critical Asset Inventory.....	2-23
2.7 Government.....	2-32
2.7.1 City of Sugar Land Schools.....	2-34
Section 3 PLANNING PROCESS	3-1
3.1 City of Sugar Land Hazard Mitigation Planning Committee	3-1

Table of Contents

3.1.1	Additional Partners	3-2
3.2	Plan Organization	3-4
3.3	Planning Team Goals and Objectives.....	3-4
3.4	Review of Existing Technical/Planning Information	3-6
3.5	Public Involvement.....	3-7
Section 4	RISK AND VULNERABILITY ASSESSMENT	4-1
4.1	Risk and Vulnerability Assessment Process	4-1
4.2	Natural Hazards	4-4
4.2.1	Severe Winter Storms.....	4-4
4.2.2	Severe Thunderstorms.....	4-6
4.2.3	Lightning	4-11
4.2.4	Extreme Temperatures	4-12
4.2.5	Hailstorms.....	4-15
4.2.6	Flooding.....	4-17
4.2.7	Drought.....	4-23
4.2.8	Hurricanes/Tropical Storms.....	4-25
4.2.9	Tornadoes	4-29
4.3	Technological Hazards	4-32
4.3.1	Dam and Levee Failure	4-32
4.3.2	Terrorism	4-37
4.3.3	Hazardous Materials Spills.....	4-40
4.3.4	Energy/Fuel Shortage.....	4-42
4.3.5	Aircraft Accidents/Transportation Accidents.....	4-43
Section 5	MITIGATION STRATEGIES	5-1
Section 6	EXECUTING THE PLAN.....	6-1
6.1	Plan Implementation.....	6-1
6.2	Evaluation	6-1
6.3	Plan Update	6-2
6.4	Plan Maintenance	6-2
6.5	Incorporation into Existing Planning Mechanisms	6-2
Section 7	SUMMARY	7-1
7.1	Conclusion	7-1
7.2	References.....	7-1

List of Tables

Table 2-1	Demographics	2-2
Table 2-2	Legal and Regulatory Capabilities	2-20
Table 2-3	Land Administrative and Technical Capabilities	2-22
Table 2-4	Fiscal Capabilities	2-23
Table 2-5	City of Sugar Land Critical Facilities.....	2-24
Table 2-6	Fort Bend Independent School District Critical Facilities in Sugar Land.....	2-25
Table 3-1	City of Sugar Land Hazard Mitigation Planning Committee	3-1

Table 3-2 City of Sugar Land Hazard Mitigation Planning Stakeholders	3-3
Table 3-3 Calendar of Events	3-5
Table 3-4 Outreach Conducted for Public Meetings	3-8
Table 4-1 Hazards Included in the Risk and Vulnerability Assessment	4-1
Table 4-2 Hazards Not Included	4-2
Table 4-3 Severe Winter Storms	4-5
Table 4-4 Beaufort Wind Scale	4-7
Table 4-5 Thunderstorms and High Winds	4-9
Table 4-6 Lightning	4-11
Table 4-7 Extreme Temperatures Incidents	4-13
Table 4-8 Tornado and Storm Research Organization Hail Storm Intensity Scale	4-15
Table 4-9 Hail Incidents	4-16
Table 4-10 Significant Floods Incidents	4-20
Table 4-11 Repetitive Loss Properties in the City of Sugar Land	4-21
Table 4-12 Palmer Drought Severity Index	4-23
Table 4-13 Drought Incidents in and around Fort Bend County	4-24
Table 4-14 Saffir-Simpson Hurricane Scale	4-26
Table 4-15 Hurricanes and Tropical Storms	4-26
Table 4-16 Probability of Tropical Storms and Hurricanes Impacting Sugar Land	4-27
Table 4-17 Enhanced Fujita Scale	4-30
Table 4-18 Confirmed Tornadoes	4-31
Table 4-19 National Inventory of Dams Classifications	4-32
Table 4-20 Hazmat Incident Responses	4-41
Table 5-1 City of Sugar Land Mitigation Strategies	5-3

List of Figures

Figure 2-1 Location Map of City of Sugar Land, Texas	2-2
Figure 2-3 City of Sugar Land Current Land Use	2-8
Figure 2-4 City of Sugar Land Zoning	2-9
Figure 2-5 Future Planned Land Use	2-11
Figure 2-6 City of Sugar Land Water Sheds	2-14
Figure 2-7 Transportation Routes	2-15
Figure 2-8 City of Sugar Land Airport	2-19
Figure 2-9 City of Sugar Land Emergency Medical Services (EMS) Location	2-29
Figure 2-10 City of Sugar Land Fire Station Locations	2-30
Figure 2-11 City of Sugar Land Police Department	2-31
Figure 2-12 Single Member Council Boundaries in the City of Sugar Land	2-33
Figure 2-14 City of Sugar Land Area Schools	2-34
Figure 4-1 Hazard Identifications/Classifications	4-3
Figure 4-2 Extreme Heat in Texas	4-13
Figure 4-3 City of Sugar Land Flood Zones	4-19
Figure 4-4 Hurricane Activity in the Conterminous United States	4-25
Figure 4-5 Tornado Risk Areas in the Conterminous United States	4-29
Figure 4-6 Location of Dams in the City of Sugar Land	4-34

Table of Contents

Figure 4-7 City of Sugar Land Levee Improvement Districts.....	4-34
--	------

Mitigation Vision for the Future

Mitigation should be the very foundation of every emergency management agency's plans and procedures. Emergency management agencies must adopt mitigation practices to reduce, minimize, or eliminate hazards in their community. The Disaster Mitigation Act of 2000 (PL 106-390) outlines the criteria for communities to successfully implement hazard mitigation practices.

The City of Sugar Land realizes the benefits achieved by the development and implementation of mitigation plans and strategies. City of Sugar Land elected officials, public safety organizations, planners, private entities, and many others have worked together in the development and implementation of this hazard mitigation plan, proving that they have the vision to implement mitigation practices and therefore reduce the loss of life and property in their community.

Section 1

PLAN, BACKGROUND, AND PURPOSE

1.1 Overview

The City of Sugar Land Hazard Mitigation Plan (HMP) as written fulfills the requirements of the Disaster Mitigation Act of 2000, which is administered by the Federal Emergency Management Agency (FEMA). The Disaster Mitigation Act provides federal assistance to state and local emergency management to mitigate the effects of disasters. The HMP also encourages cooperation among various organizations and crosses political subdivisions.

1.2 Authority

Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act Title 44 CFR as amended by Section 102 of the Disaster Mitigation Act of 2000 gives state and local governments the framework to evaluate and mitigate all hazards as a condition of receiving federal disaster funds. The City of Sugar Land HMP is a requirement of the law. In Texas, federal regulatory authority for hazard mitigation planning resides with FEMA Region VI.

1.3 Scope

The scope of the City of Sugar Land HMP encompasses all areas of City of Sugar Land, as noted in Section 1.1 (above). The plan will identify the natural and technological hazards that could threaten life and property in our communities. The scope of this plan includes both short-term and long-term mitigation strategies, implementation, and possible sources of project funding.

The plan also contains the following information:

- General information about the plan (Executive Summary)
- The vision for mitigation in our community (Preface)
- The profile of City of Sugar Land, its geography, history, physical features, and other community indicators (Section 2: Community Profile)
- The planning process and the involvement of all levels of governments, the public, the private sector, and other community players (Section 3: Planning Process)
- Documentation of City of Sugar Land's past and predicted exposure to natural hazards and the potential risks that include the impacts on critical infrastructure with anticipated losses (Section 4: Risk and Vulnerability Assessment)
- An overview of City of Sugar Land's capabilities to implement hazard mitigation goals and objectives, policies that will effectively mitigate risks to our community (Section 5: Mitigation Strategies)
- Procedures for maintaining an effective, long-range HMP and the strategy to implement it (Section 6: Executing the Plan)

Section 1

- Critical facilities information
- Documentation of the process (Appendixes)

1.4 Purpose

The purpose of the City of Sugar Land HMP is to identify risks and vulnerabilities and to formulate a plan of action to reduce damage and loss of life from natural and technological disasters. This plan shall serve as a benchmark for future mitigation activities and will identify mitigation goals and objectives for the City of Sugar Land. The plan will also prioritize potential risks and vulnerabilities in an effort to minimize the effects of disasters in the community.

Realizing that identifying the community's risks and working collectively toward the prevention of disasters is in everyone's best interest, The City of Sugar Land Department of Emergency Management has taken a lead role in the development of the City of Sugar Land HMP.

Mitigation planning is imperative to lessen the impact of disasters in the City of Sugar Land. The written plan is an excellent method by which to organize the City of Sugar Land's mitigation strategy. The implementation of the plan and its components is vital to achieve a community that is resistant to the effects of a disaster. The implementation of the plan will reduce loss of life and property and allow the community to prosper with minimal disruption of vital services to its citizens. The plan provides a risk assessment of the hazards the City of Sugar Land is exposed to and puts forth several mitigation goals and objectives that are based on that risk assessment. This plan has been formally adopted and is required to be updated every five years.

1.5 Consistency with Federal and State Mitigation Policies

The plan is intended to enhance and complement state and federal recommendations for the mitigation of natural and technological hazards in the following ways:

- Substantially reduce the risk of loss of life, injuries, and hardship from the destruction of natural and technological disasters on an ongoing basis.
- Improve the public's awareness of the need for individual preparedness and building safer, more disaster-resilient communities.
- Develop strategies for long-term community sustainability during community disasters.
- Develop governmental and business continuity plans that will continue essential private sector and governmental activities during disasters.

FEMA publishes many guidance documents for local governments for mitigating natural disasters. The City of Sugar Land HMP fully recognizes, adopts, incorporates, and endorses the following principles:

- Develop a strategic mitigation plan for the City of Sugar Land.
- Enforce current building codes.
- Develop incentives to promote mitigation.
- Incorporate mitigation of natural hazards into land-use plans.

- Promote awareness of mitigation opportunities and programs throughout our community on a continual basis.
- Identify potential funding sources for mitigation projects.

The private sector is often an overlooked segment of the community during disasters. It is vital that this sector of a community is included in mitigation efforts that are consistent with state and federal recommendations such as the following:

- Develop mitigation incentives with insurance agencies and lending institutions.
- Encourage the creation of a business continuity plan for the continuance of commerce during disasters.
- Partner with businesses in an effort to communicate with customers about the hazards in our community and possible solutions.

Individual citizens must be made aware of the hazards they face. Additionally, they must be educated in how to protect themselves from the hazards they face. They must be shown that mitigation is an important part of reducing loss of life and property in their community. Their support is critical to the success of any mitigation effort. The City of Sugar Land HMP supports the following FEMA recommendations regarding individual citizens:

- Become educated on the hazards that you and your community face.
- Become part of the process by supporting and encouraging mitigation programs that reduce vulnerability to disasters.
- Take individual responsibility for safeguarding yourself and your family prior to a disaster.

1.6 Goals and Objectives

The following goals and objectives are the basis of this plan and summarize what the City of Sugar Land Hazard Mitigation Planning Committee will accomplish as a result of implementing this plan.

- Maximize the use of all resources by promoting intergovernmental coordination and partnerships in the public and private sectors.
- Harden our communities against the effects of disasters through the development of new mitigation strategies and strict enforcement of current regulations that have proved effective.
- Reduce and, where possible, eliminate repetitive damage, loss of life, and property from disasters.
- Bring greater awareness throughout the community about potential hazards and the need for community preparedness.
- Continue city training for City of Sugar Land departments.

Section 2

COMMUNITY PROFILE

2.1 Overview

The City of Sugar Land is located in southeast Texas. It is located southwest of Houston in Fort Bend County, where it borders the cities of Stafford and Missouri City. The City of Sugar Land has a total area of 24.9 square miles, with land accounting for 24.1 square miles of the area. This land is utilized mostly for residential development as well as commercial and industrial use. The urban area is 71.7 percent residential, 15.97 percent commercial, and 12.3 percent industrial.

This urban area originated as the Oakland Plantation. The earliest settlers arrived in the 1820's to plant the area with cotton, corn, and sugar cane. By 1843, the City of Sugar Land had its own sugar mill and Benjamin Franklin Terry, famous for leading Terry's Texas Rangers, and William Jefferson Kyle purchase the Plantation in 1852. In 1853, the pair of pioneers renamed the plantation Sugar Land. Following the Civil War, a Confederate veteran by the name of Colonel Edward H. Cunningham purchased the property and built the first sugar refinery as well as the first railroad. His leadership grew the area from a fledgling town to a booming industrial city that included a store, post office, paper mill, acid plant, meat market, boarding house, and depot.

The City of Sugar Land was incorporated in 1959 as a "General Law" city and remained such until January 17, 1981, at which time a special city election was held to establish a municipal government. Voters approved the adoption of a home rule charter in accordance with the constitution and statutes of the state of Texas. The type of municipal government provided by this Charter was known as "mayor-council" government and all powers of the City were invested in a Council composed of a mayor and five councilmen. An amendment on May 5, 1990, changed the composition of the City Council to a mayor, four council members to be elected by single-member districts, and two council members by at-large position. This composition remains in effect, with term limits of eight consecutive years.

The current landscape of Sugar Land is that of a thriving community that is home to more than 82,000 people and growing. It is a diverse community, where minority populations account for 48 percent of the total population. The largest of these populations is the Asian community, whose different ethnicities account for 35 percent of the Sugar Land population. The growing population is a result of cultural amenities, high salaries, and a pro-business environment that earned the City of Sugar Land a place in Forbes 25 "Top Towns to Live Well".

Figure 2-1
Location Map of City of Sugar Land, Texas



Source: "Best Small Cities for Startups." *Businessweek.com*. N.p., n.d. Web. 21 Aug. 2013.

2.2 Demographics

The City of Sugar Land's 2012 population was 82,480, which is a 4.3 percent increase from the 2010 population count. The City of Sugar Land is on target to grow by an additional 4 percent by 2013. This increase makes City of Sugar Land the 49th most populated city in the State of Texas.

The following statistical data from the U. S. Census Bureau represents the demographics of City of Sugar Land, Texas.

Table 2-1
Demographics¹

People Quick Facts	City of Sugar Land	Texas
Population, 2012 estimate	82,480	26,059,203
Population, 2010 (April 1) estimates base	79,113	25,145,561

¹ U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report

People Quick Facts	City of Sugar Land	Texas
Population, percent change, April 1, 2010 to July 1, 2012	4.3%	3.6%
Persons under 5 years, percent, 2010	5.3%	7.7%
Persons under 18 years, percent, 2010	24.6%	27.3%
Persons 65 years and over, percent, 2010	10.4%	10.3%
Female persons, percent, 2010	50.4%	50.4%
White alone, percent, 2010 (a)	52.0%	70.4%
Black or African American alone, percent, 2010 (a)	7.4%	11.8%
American Indian and Alaska Native alone, percent, 2010 (a)	0.2%	0.7%
Asian alone, percent, 2010 (a)	35.3%	3.8%
Native Hawaiian and Other Pacific Islander alone, percent, 2010 (a)	Z	0.1%
Two or More Races, percent, 2010	2.8%	2.7%
Hispanic or Latino, percent, 2010 (b)	10.6%	37.6%
White alone, not Hispanic or Latino, percent, 2010	44.4%	45.3%
Living in same house 1 year & over, 2006-2010	88.0%	85.5%
Living in same house 1 year & over, percent, 2007-2011	90.1%	82.1%
Foreign born persons, percent, 2007-2011	34.0%	16.2%
Language other than English spoken at home, percent age 5+, 2007-2011	43.2%	34.4%
High school graduate or higher, percent of persons age 25+, 2007-2011	92.1%	80.4%
Bachelor's degree or higher, percent of persons age 25+, 2007-2011	54.6%	26.1%
Veterans, 2007-2011	3,240	1,618,413
Mean travel time to work (minutes), workers age 16+, 2007-2011	28.6	24.8
Housing units, 2010	27,727	9,977,436
Homeownership rate, 2007-2011	80.7%	64.5%
Housing units in multi-unit structures, percent, 2007-2011	10.6%	24.0%

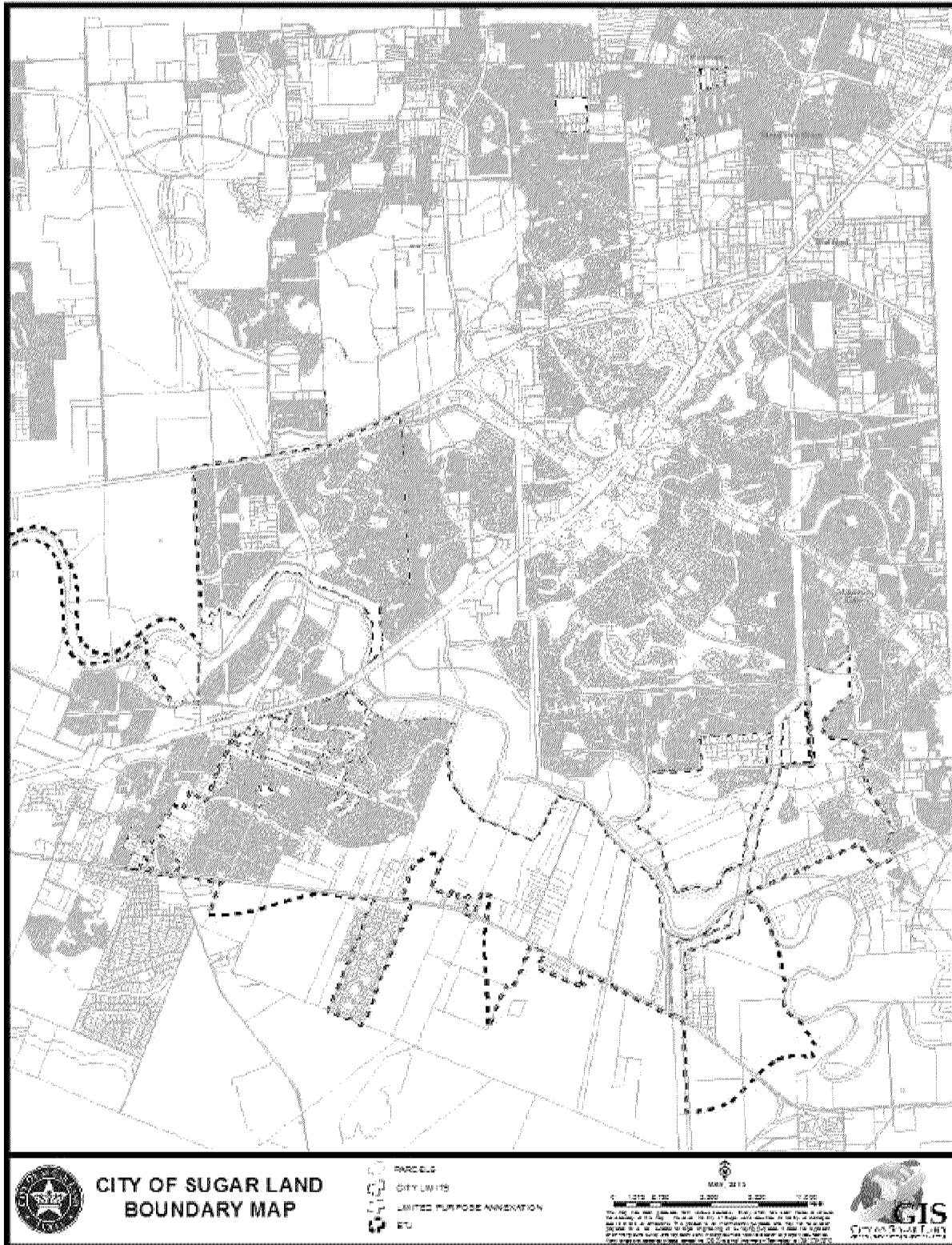
Section 2

People Quick Facts	City of Sugar Land	Texas
Median value of owner-occupied housing units, 2007-2011	\$241,000	\$126,400
Households, 2007-2011	25,746	8,667,807
Persons per household, 2007-2011	3	2.79
Per capita money income in the past 12 months (2011 dollars), 2007-2011	\$43,529	\$25,548
Median household income, 2007-2011	\$103,265	\$50,920
Persons below poverty level, percent, 2007-2011	5.4%	17.0%

Geography Quick Facts	City of Sugar Land	Texas
Land area in square miles, 2010	32.38	261,231.71
Persons per square mile, 2010	2,434.2	96.3
FIPS Code	70808	48
County	Fort Bend County	

Business Quick Facts	City of Sugar Land	Texas
Total number of firms, 2007	10,990	2,164,852
Black-owned firms, percent, 2007	6.5%	7.1%
American Indian- and Alaska Native-owned firms, percent, 2007	-	0.9%
Asian-owned firms, percent, 2007	26.7%	5.3%
Native Hawaiian and Other Pacific Islander-owned firms, percent, 2007	-	0.1%
Hispanic-owned firms, percent, 2007	9.4%	20.7%
Women-owned firms, percent, 2007	27.7%	28.2%
Manufacturers' shipments, 2007 (\$1000)	1,577,858	593,541,502
Merchant wholesaler sales, 2007 (\$1000)	3,573,113	424,238,194
Retail sales, 2007 (\$1000)	1,719,913	311,334,781
Retail sales per capita, 2007	\$21,716	\$13,061
Accommodation and food services sales, 2007 (\$1000)	244,448	42,054,592

Figure 2-2
City of Sugar Land Boundaries



2.3 Economy

The City of Sugar Land boasts a strong climate for commerce due to its workforce talent and incentive program. The workforce is highly educated, with 55 percent of residents holding a bachelor's degree or higher. The City of Sugar Land also has one of the lowest city property tax rates in Texas, lowering its tax rate by 40 percent since 1992.

The City of Sugar Land's labor force size is 42,450, with 40,264 citizens employed. The diversification, corporate vitality, and quality life in the City have earned Sugar Land the honor of being one of the "Top Cities in Texas" for business relocation and expansion. The industries that call Sugar Land home are diverse. Major employers include Minute Main, Schlumberger, Tramontina USA, Fluor Corporation, Bechtel Equipment Operations, Noble Drilling, Monday Management International, and Aetna.

United States Census Data shows 25,746 households in the City of Sugar Land with an average household size of 3 people. The median household income for City of Sugar Land is \$103,265. The poverty rate for City of Sugar Land is 5.4 percent, much lower than the 17 percent poverty rate throughout the State of Texas.

2.4 Climate

The City of Sugar Land climate is defined as humid subtropical, characterized by hot, humid summers and mild to cool winters. The City averages 48 inches of precipitation throughout the year due to winds from the south and southeast Gulf of Mexico. During the summer, high temperatures around 94°F are reached throughout July and August with dew points in the 70s. This creates a heat index of approximately 100°F each day. As a result of the humidity and heat, it is common to experience thunderstorms more than one third of the month. Winter months in the City of Sugar Land are mild, and generally cool and temperate. The average temperature in the winter months of January and February is 42°F and 45°F, respectively. Snow is very unusual in Sugar Land but ice storms do happen occasionally. The majority of winter precipitation in the area occurs when north winds bring winter rains.

The United States Environmental Protection Agency conducted the Intergovernmental Panel on Climate Change Fourth Assessment Report to determine how climate change would impact Region 6, which includes the State of Texas. Their basic findings are listed below.²

- A shift toward a warmer climate with an increase in extreme high temperatures and a reduction in extreme low temperatures. These changes have been especially apparent in the western half of North America.
- Abnormally hot days and nights and heat waves are very likely to become more frequent. Cold days and cold nights are very likely to become much less frequent.
- Increasing stress due to heat waves. This may lead to more illness and death, particularly among the young, elderly and frail.
- Respiratory disorders may be exacerbated by warming-induced deterioration in air quality.

² "Climate Change 2007: The Physical Science Basis," Intergovernmental Panel on Climate Change, 2007.

- It is likely that droughts will become more severe in the southwestern United States, in part because precipitation in the winter rainy season is projected to decrease.
- The growing season length is expected to increase. However, as temperature rises, crops grown in the Southwestern United States will increasingly experience temperatures above their optimum, and animal production of meat or dairy products will be impacted by temperature extremes.
- Weeds and other invasive plants will continue to migrate northward.
- Arid areas are very likely to experience increases in erosion and fire risk.
- An increase in the length of the forest fire season and the area subject to forest fires may increase.
- Additional stress to ground water and surface water sources that are already overtaxed in many areas may occur.
- Changes in the abundance and spatial distribution of species, and expanded ranges of tree killing insects, vector-borne and tick-borne diseases may occur.
- Precipitation is likely to be less frequent but more intense, and precipitation extremes are very likely to increase.
- Management of Western reservoir systems is very likely to become more challenging as runoff patterns continue to change.
- Increased weather related losses of property may result.
- The Gulf Coast area may experience rising sea levels.
- It is likely that hurricane intensity will increase in response to human-caused warming, but this requires further study.

2.5 Land Use

44 CFR Requirement 201.6 (c)(2)(ii)(C)

Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

2.5.1 Current Land Use

The most current City of Sugar Land Comprehensive Plan was developed in 2004 after the City Council realized in 2000 that a 158 percent increase in population in 10 years required strategic planning. The process to update the plan began in 2011 and Chapters 1 through 5, which incorporated Vision 2025 and the Guiding Principles Resolution. A list of goals was developed to guide the planning process. Goals included providing a clean, safe, and aesthetically pleasing city; promoting a vibrant, diversified economy; providing a multi-modal transportation system; redeveloping in harmony with the surrounding community; providing quality infrastructure and critical facilities; and expanding the corporate limits of the City in a prudent manner. The newest

Currently, the City of Sugar Land provides a good balance between residential and commercial land use. There is little area left that is utilized as agricultural space, but the City does provide robust parks and open space structure for their citizens.

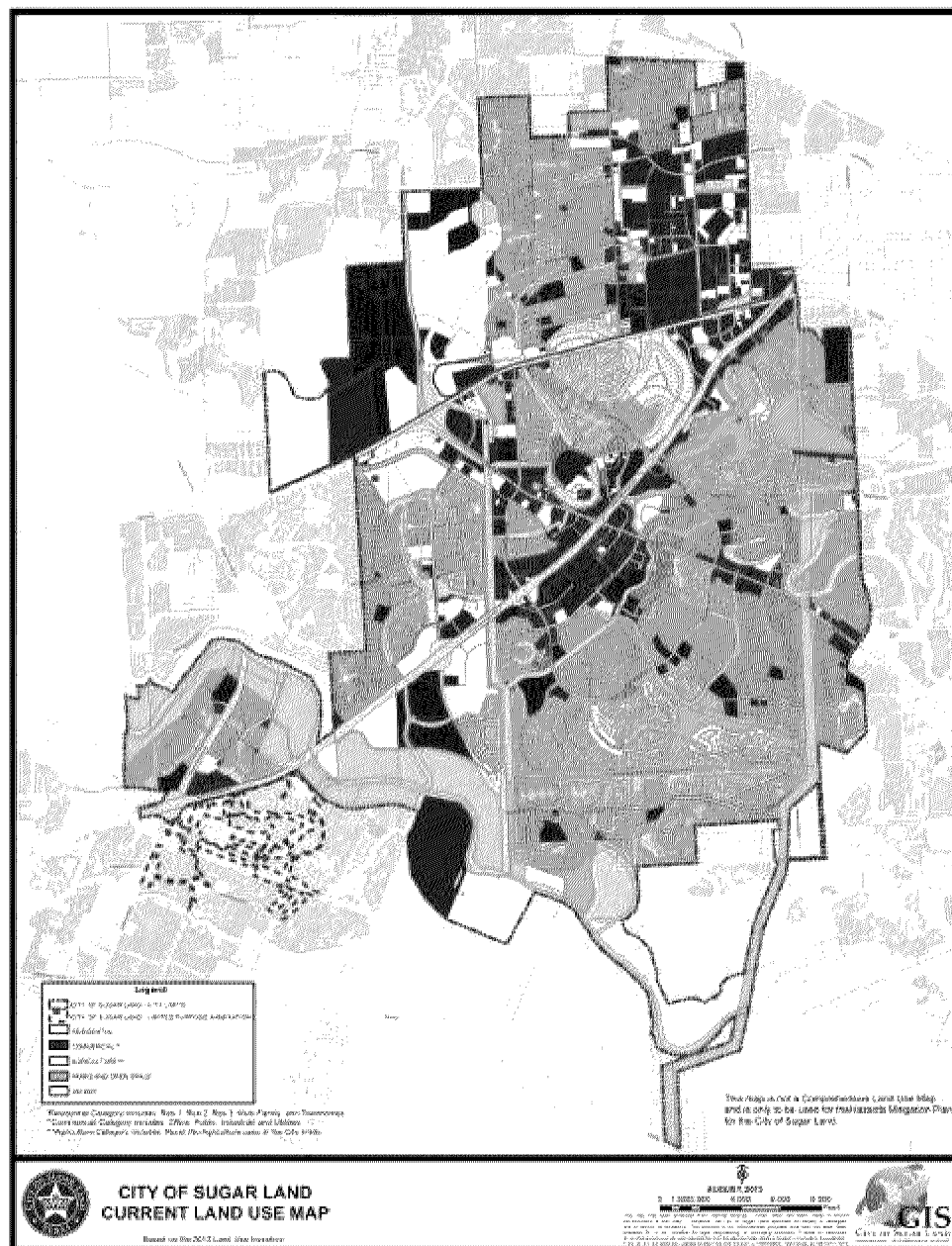
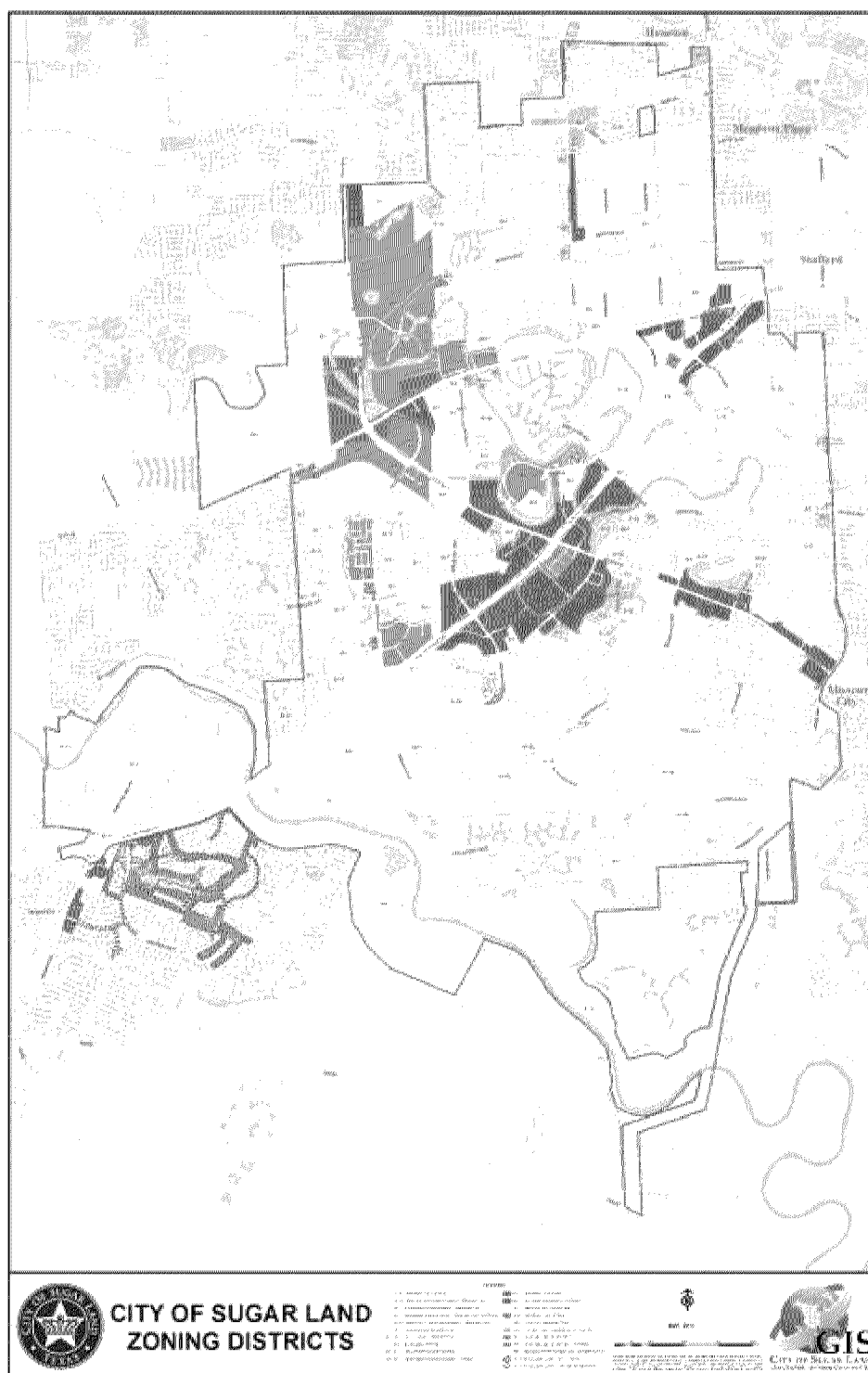


Figure 2-4
City of Sugar Land Zoning



2.5.2 Future Land Use

In 2012, the City of Sugar Land updated the majority of its City of Sugar Land Comprehensive Plan. This includes chapter 1-5, which covers the history of comprehensive planning in Sugar Land, provides a community profile, and details development trends. The Land Use Plan, which is Chapter 6 of the City of Sugar Land Comprehensive Plan, is undergoing an update and is not complete as of the completion of the City of Sugar Land Hazard Mitigation Plan.

Future development in Sugar Land is influenced by the following factors:

- Development of vacant residential land within the City limits and annexation of existing residential neighborhoods in the extraterritorial jurisdiction (ETJ) will increase the population to 95,313 people by 2020.
- Full build out of residential land within the January 2012 City limits will likely occur by 2025. At full build out, population increases may require new development patterns to accommodate a larger variety of housing opportunities.
- Redevelopment may become more commonplace as the region becomes more densely developed. The economics of such redevelopment may drive commercial redevelopment to occur at a higher density with a mix of uses.
- Areas south of the Brazos River will likely experience increased development pressures because of limited development opportunities north of the River. The City's Future Land Use Plan (2012) designates this area primarily as large residential estate lots. The relatively limited access via F.M. 2759 will limit the speed and types of development feasible in this area.

According to the Comprehensive Plan, development in the City is guided by the City's Development Code and Subdivision regulations. Developments over 50 acres in size proposed for residential use or over 30 acres for non-residential use must follow an approved general plan. This process for larger developments has allowed the City to plan future growth. The general plan outlines the land use, circulation, and building phases of the proposed project. The general plan process also allows for the coordination with City master plans like the Thoroughfare Master Plan, Pedestrian and Bicycle Master Plan, and the utility master plans for Water and Wastewater. The City Council and Planning and Zoning Commission must approve the general plan before the development occurs, and the general plan serves as a guide throughout the development process.

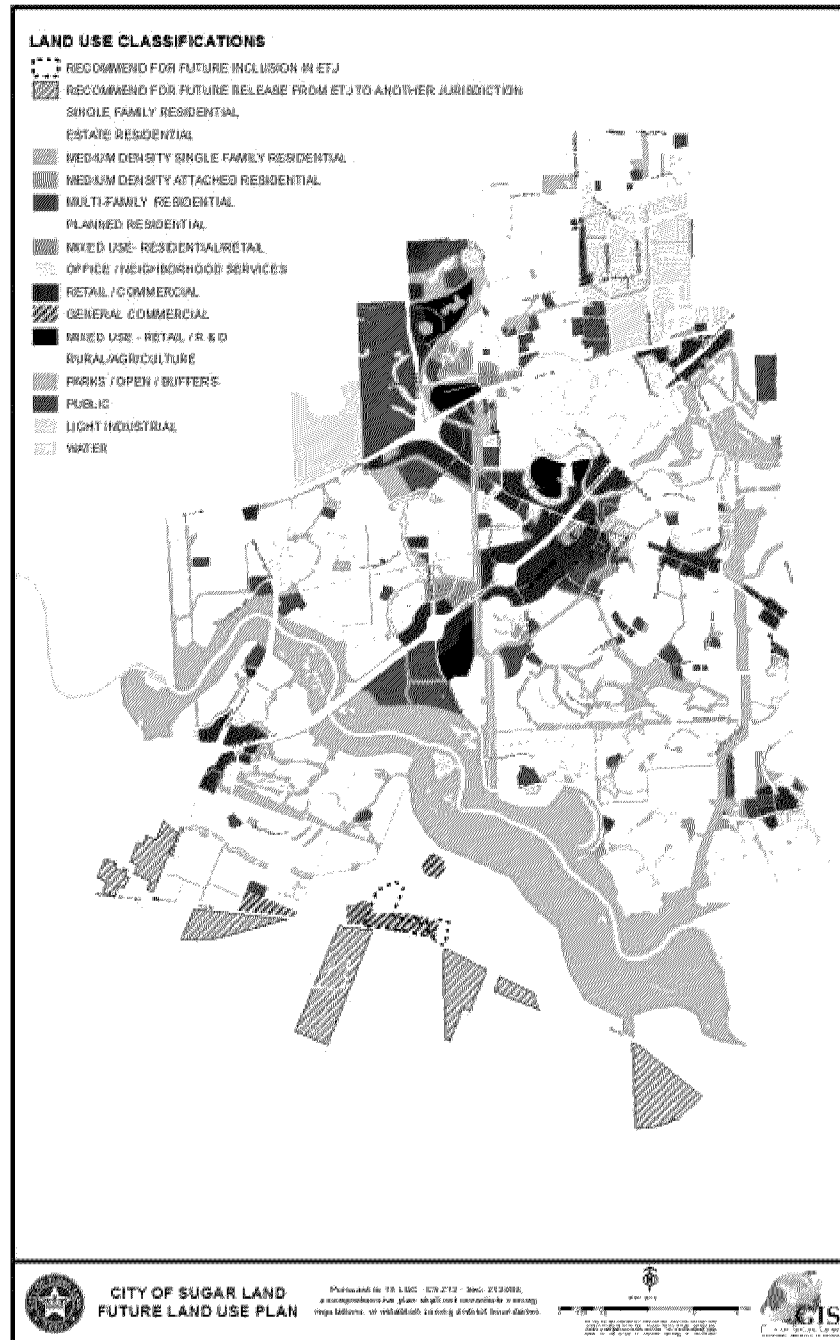
There are two major developments currently underway in the City of Sugar Land. Lake Point Towne Center is largely developed and is a custom-zoned, planned development of nearly 200 acres that includes residential, office, retail, medical, and recreational uses. It will be a waterfront urban village with portions of the property being gated communities with access to nearly any type of service needed. Another major development is Telfair, formerly State Prison Farm Tracts 4 and 5. Development includes a mix of residential living units as well as including a civic center, elementary school, extensive trail and lake system, retail and commercial space, the Houston Museum of Natural Science at Sugar Land, and a city fire station.

Additionally, the Imperial redevelopment project is going through development and zoning approval process; the Central Prison Unit is now zoned for M-1 Restricted Industrial land use, providing large-scale commercial and industrial development opportunities; and the

redevelopment of Riverstone in the City ETJ is currently underway. The first residential development is underway, a stadium was built in 2012, and all of the major streets are constructed.

Figure 2-5 is the map of future land use planned for City of Sugar Land.

**Figure 2-5
Future Planned Land Use**



2.5.3 Watersheds

The City of Sugar Land is located in both the Brazos River Basin and San Jacinto-Brazos Coastal Basin. In terms of local waterways, the City falls in the Austin/Oyster sub-basin and Oyster Creek sub-watershed of the San Jacinto-Brazos Coastal Basin and the Lower Brazos sub-basin of the Brazos River Basin. An overview of the basins has been provided via the City of Sugar Land Water Conservation Program³.

Upper Oyster Creek

The City's future surface water supply comes directly from the Upper Oyster Creek, located within the San Jacinto-Brazos River Coastal Basin, southwest of Houston within the northern portion of Fort Bend County. However, the primary source of water for the Oyster Creek watershed will be pumpage from the Brazos River as surface water becomes a more dominant use in the watershed; therefore, water will be supplied indirectly from the Brazos River Basin as well. Over the years, Upper Oyster Creek has been significantly modified, and it currently serves as a segment of a water conveyance system operated by the Gulf Coast Water Authority. Seasonally, water is pumped into Upper Oyster Creek from the Brazos River to provide agricultural and industrial water resources to the region.

In the near future, additional water supplies will be pumped through Oyster Creek from the Brazos River to serve as the primary potable water source for the City of Sugar Land, adding municipal use to the category of uses served. Surface water traveling through the Oyster Creek watershed will supply approximately 60 percent of the potable water demand for the City and its Groundwater Reduction Plan participants by the year 2025. The City also leases water rights held on Oyster Creek by the Fort Bend County Water Control and Improvement District No. 1 for the future use of non-potable water supply projects for irrigation and lake filling.

The Upper Oyster Creek watershed occupies approximately 278 square kilometers and lies within a climatic region classified as subtropical humid with hot summers and dry winters. The watershed is quickly becoming urbanized and includes portions of several municipalities, including Fulshear, Missouri City, Stafford, and Sugar Land. With the numerous urbanized areas located within the Upper Oyster Creek watershed, the watershed is affected by a variety of sources ranging from municipal and industrial wastewater discharges to storm water runoff.

In June 2001, the Texas Commission on Environmental Quality (TCEQ) initiated two Total Maximum Daily Load (TMDL) studies on Oyster Creek: a bacteria study and a dissolved oxygen study. The TCEQ has conducted these studies as an element of the TMDL program initiated by the Environmental Protection Agency. Oyster Creek was selected for this program due to its classification as a historically impaired water body and its listing on the Texas 303(d) List for high bacteria levels and low concentrations of dissolved oxygen.

The Upper Oyster Creek Bacteria TMDL was adopted by the TCEQ on August 8, 2007. During the Implementation Phase of the TMDL process, the stakeholders will coordinate with the TCEQ to formulate and implement a plan detailing reasonable best management practices (BMPs) that may help lower bacteria levels in Upper Oyster Creek. As the Implementation Phase progresses, the City will revise the Storm Water Master Plan to reflect TMDL requirements. In addition, the Upper Oyster Creek Dissolved Oxygen TMDL was similarly adopted. Upon completion and

³ City of Sugar Land Water Conservation Program. City of Sugar Land Utilities Department. June 1, 2010.

adoption of the TMDL study, the stakeholders will coordinate efforts to ensure proper implementation of the TMDL requirements.

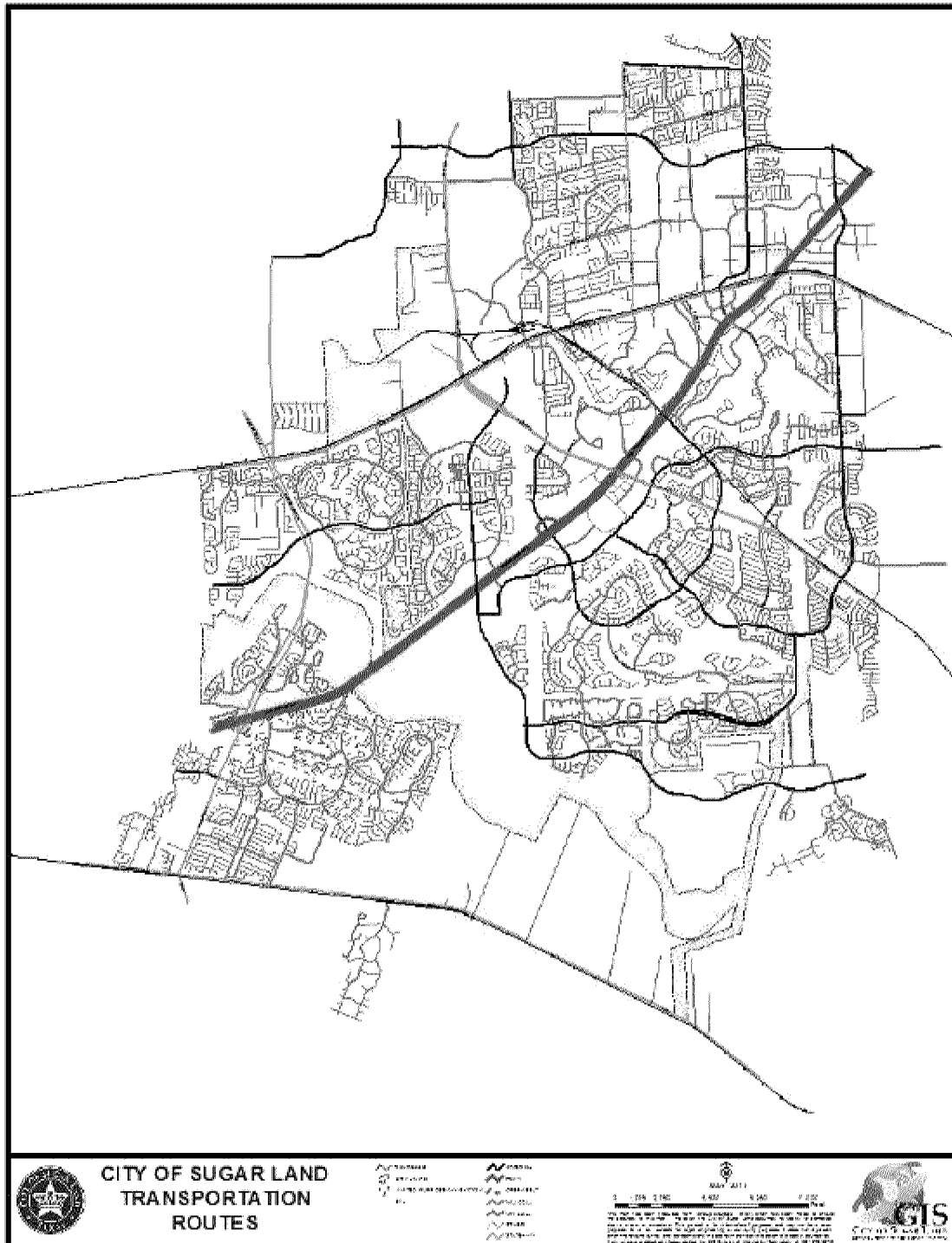
Growth in and around this potable source watershed, in the City and its extraterritorial jurisdiction (ETJ); the growing scarcity of state water resources; the greater costs involved in treating and distributing surface water; and the ecological impact of greater water withdrawals all offer incentive to promote water conservation as one tool among many in a comprehensive water supply and quality solution for the City of Sugarland and the region.

Brazos River

The City of Sugarland's wastewater treatment plants discharge into the Brazos River (far downstream of the pumping station that feeds Oyster Creek to the northwest. The Brazos River also serves, as noted above, as the future potable water source for the City. The Brazos River is greatly affected by seasonal variation in water quality in great part due to the series of reservoirs operated by the Brazos River Authority. The releases from these reservoirs often include elevated levels of chlorides.

2.5.4 Transportation

Figure 2-7
Transportation Routes



2.5.5 Trucking Traffic

The City of Sugar Land includes a variety of thoroughfares, as shown in the City of Sugar Land's Major Thoroughfare Plan Update. Trucks in Sugar Land use a variety of transportation routes to reach their destinations. These include freeways, state highways, arterials, major collectors, and minor collectors. The only existing freeway within Sugar Land is U.S. Route (US) 59. State Highway (SH) 99 is currently a state highway but will be designated as a freeway once toll lanes are constructed, which is under development.

Other state highways include SH 6, US 59, US 90A, and Farm to Market Route (FM) 2759. These roadways are within the City's jurisdiction but are maintained by the State of Texas Department of Transportation.

There are many planned roadway improvements that are already funded, in anticipation of new land developments as well as population growth. A table of the funded project is provided below, as shown in the City of Sugar Land Major Thoroughfare Plan Update.

Table 4 - Funded Improvements

Sponsor*	Road	Source	From**	To	Improvement	Year
COSL	Burney	FB Mobility Bond	Voss	Florence	Widen to 4 lanes divided with curb and gutter	2011
FBC	Burney	FB Mobility Bond	Florence	Old Richmond	Widen to 4 lanes divided with curb and gutter	2011
COSL	Stadium	H-GAC TIP	N of Jess Pirtle	US 90A	Construct 4 lane roadway	2015
FBCTRA	SH 99 (Segment D)	H-GAC TIP	Westpark Tollway	US 59	Construct toll lanes on existing ROW	2012
FBCTRA	SH 99 (Segment C)	H-GAC TIP	US 59	SH 288	Construct toll lanes on new ROW	2017
FBC	Bellfort	H-GAC RTP	Eldridge	Harris C/L	Widen to 6 lanes divided	2018
COSL/ COH	Dairy Ashford	H-GAC TIP	Julie Rivers	US 90A	Widen to 6 lanes	2014
COSL	Dairy Ashford	H-GAC RTP			Grade Separation over RR	2025
FBC	Dairy Ashford	H-GAC RTP	Harris C/L	Airport	Widen to 6 lanes divided	2018
COSL	Eldridge	H-GAC RTP			Underpass at US 90A	2020
FBCTRA	FB Tollway	H-GAC RTP	SH 6	SH 99	4-lane toll road and Brazos Bridge	2025
COSL	Meadowcroft	H-GAC TIP	University	First Colony	4-lane extension	2013
COSL	New Territory	H-GAC RTP	LID 17	University	Widen to 6 lanes	2019
COSL	Scenic Rivers (formally Oilfield)	H-GAC RTP	Commonwealth	University	Widen to 4 lanes	2020
COSL	University	H-GAC RTP	US 59	SH 6	Widen to 6 lanes	2016
COSL	University	H-GAC RTP	Commonwealth	SH 6	Widen to 6 lanes	2015
COSL	Williams Trace	H-GAC RTP	US 59	Oyster Creek bridge	Widen to 6-lanes	2015

* COSL – City of Sugar Land; FBC – Fort Bend County; FBCTRA – Fort Bend County Toll Road Authority

** LID – Levee Improvement District

2.5.6 Rail

The City of Sugar Land has two major Class 1 rail lines in the City area: the Union Pacific (UP) Glidden line and the Burlington Northern Santa Fe (BNSF) line.

The UP Glidden line runs along US 90A and carries approximately 32 trains daily. The majority of these trains are through trains but many businesses within Sugar Land depend on freight rail, such as NALCO Chemical Company and other business located in the Sugar Land Business Park. This rail line provides a major economic impact to the City of Sugar Land by providing industrial transportation.

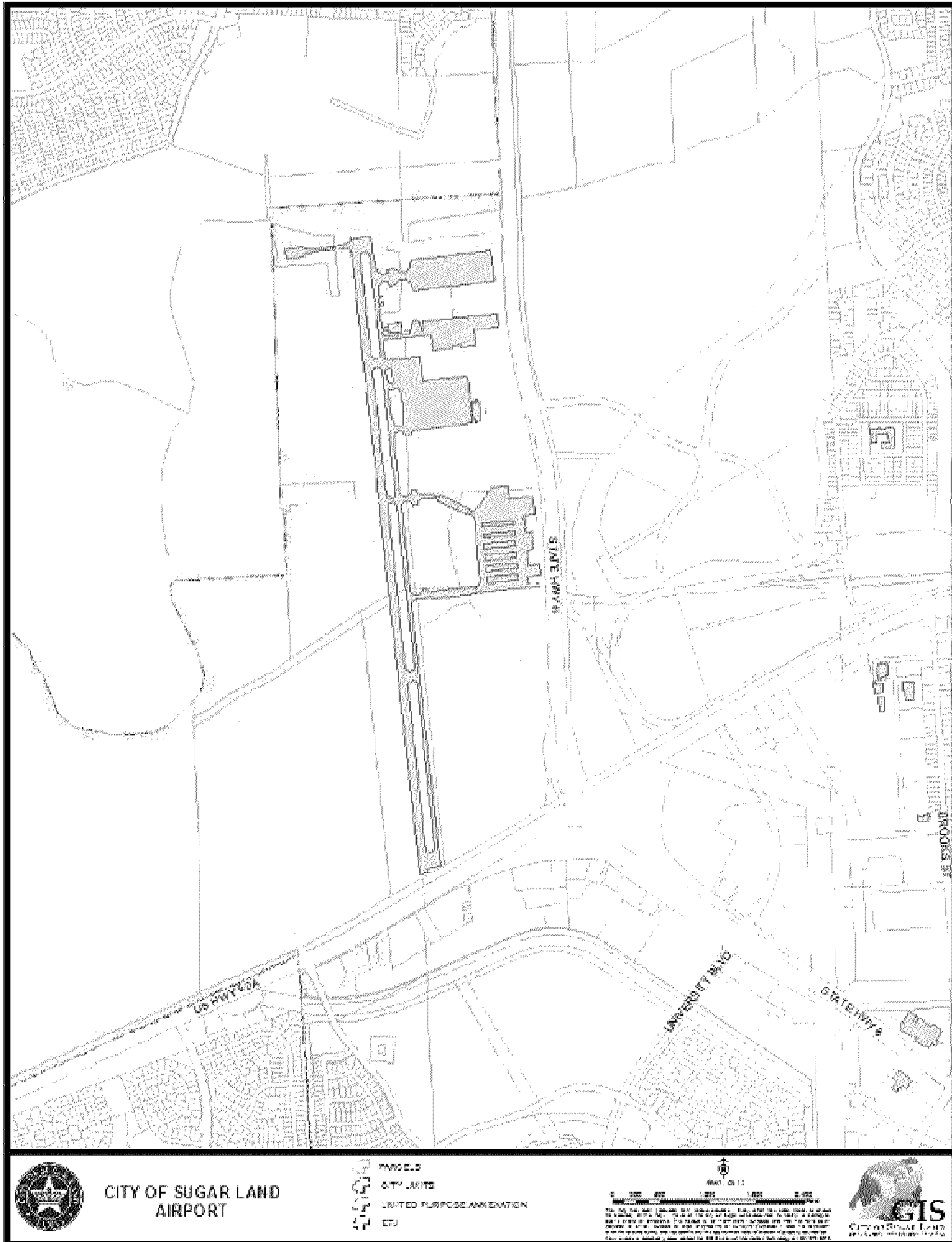
The BNSF line is a Class I line as well. It is located parallel to FM 2759 and has approximately 12 trains traveling on it per day. The BNSF line runs along an undeveloped corridor and therefore does not have the economic impact of the Glidden line.

2.5.7 Airports

The Sugar Land Regional Airport, the City's only airport, is the fourth largest airport in the greater Houston area. The Sugar Land Regional Airport focuses on corporate aviation but serves also as the foremost general reliever for the southwest sector. Additionally, it functions as one of the alternate landing sites for the National Aeronautics and Space Administration.

To continue its service to the more than 100 Fortune 500 companies that utilize the Sugar Land Regional Airport, many capital improvements are underway or scheduled for the facility. This includes a new corporate aviation terminal, a new air traffic control tower with state-of-the-art radar system, an 8,000-foot long runway, and high-intensity lighting. A map of the airport is provided below.

Figure 2-8
City of Sugar Land Airport



2.5.8 Transit

There are four transit/paratransit services operating within the City of Sugar Land. Demand Response is a curb-to-curb service with scheduled services in Fort Bend County. The Fort Bend Express is a commuter bus that transports people to Texas Medical Center and DeBakey Veteran's Affairs Medical Center. Star Vanpool operates within the Houston metropolitan area, offering vanpool services.

Commuter service is operated out of two park-and-ride lots located at the University of Houston – Sugar Land and the American Multi-Cinema (AMC) movie theater in Town Center.

2.6 Sugar Land Capabilities

The planning and response capabilities of any municipality are vital to its success in hazard mitigation. A few keys areas to ensure strong capabilities include having plans and policies in place to guide development and mitigation projects, understanding and identifying critical infrastructure, and having trained staff to assist with mitigation planning and respond to disasters. The City of Sugar Land Hazard Mitigation Planning Committee (HMPC) conducted a review of its legal, staffing, and financial capabilities related to hazard mitigation planning and the results are tabled below.

2.6.1 Legal and Regulatory Capabilities

The table below provides an overview of the legal and regulatory capabilities in the City of Sugar Land.

Table 2-2
Legal and Regulatory Capabilities

City of Sugar Land Legal and Regulatory Capability				
Regulatory Tools/Plans	Reference Number	Date Adopted	Local Authority	State Prohibited Higher Authority Electronic Copy Included
Building Codes			Y	N Y N
Capital Improvements Plan			Y	
Comprehensive Plan			Y	
Continuity of Operations/Continuity of Government Plan		2010	S	N N N
Economic Development Plan			Y	N Y N
Emergency Management Accreditation Program Certified				

City of Sugar Land Legal and Regulatory Capability				
Regulatory Tools/Plans	Reference Number	Date Adopted	Local Authority	State Prohibited Higher Authority Electronic Copy Included
Emergency Response Plan	City of Sugar Land Emergency Operations Plan		Y	N Y N
Flood Management, Plan	Part of City of Sugar Land Emergency Operations Plan		Y	N Y N
Growth Control Ordinance	Development codes and ordinances		Y	N N N
Historic Ordinance			N	N Y N
Post-Disaster Ordinance	Curfews		Y	N Y N
Post-Disaster Recovery Plan			Y	N Y N
Site Plan Requirements			Y	N N N
Subdivision Regulations			Y	N N N
Zoning Ordinances			Y	N Y N

N = No

S = State Provides

Y = Yes

2.6.2 Staffing Capabilities

A review of staffing capabilities within the City of Sugar Land was conducted to determine what staff levels exist for supporting mitigation activities.

**Table 2-3
Land Administrative and Technical Capabilities**

City of Sugar Land Administrative and Technical Capabilities					
Position	Staff/Personnel Resources	Department/Agency	Number Fully Trained	Number Fully Equipped	Total Personnel
Agriculture Resource	County Agents	Fort Bend County			Unk
Construction Practices	Inspectors	Permits and Inspections	7	7	7
Emergency Manager	Certified Professional	Emergency Manager	1	1	1
Emergency Staff	Specialist,& Administration	Emergency Management	2	2	2
Emergency Medical Services First Responder	Certified Professional	Fire Department	102	102	102
Fire Personnel	Certified Professional	Fire Department	102	102	106
Floodplain Manager	City Engineer				
Geographic Information System and/or HAZUS	Professionals	Information Technology	2	2	2
Government Elected	Elected Officials	Mayor and council	7	7	7
Government Administration	Professionals	City & Assistant Manager	4	4	10
Hazmat Team	Certified Professional	Fire Department	20	12	20
Land Use/Management	Professionals	Planning and Code Services	11	11	11
Law Enforcement	Certified Professional	Police Department	129	129	169
Medical Practitioners	Local Health Authority / Medical Director				
Public Works	Directors & Staff	Public Works	56	56	56
Public Communication	Directors & Staff	Communications Department	9	9	9
Aircraft Fire Rescue	Certified Professional	Fire Department	20	20	20
Technical Rescue	Certified Professional	Fire Department	20	20	20
Public Safety Dispatch	Certified Professional	Police Department	17	17	17
Capital Improvement Projects	Inspectors	Engineering	3	3	3

Unk = Unknown

2.6.3 Fiscal Capabilities

The City of Sugar Land HMPC provided a list of the community grants received to assist with activities in the emergency management cycle, including mitigation activities.

Table 2-4
Fiscal Capabilities

City of Sugar Land Fiscal Capabilities					
Financial Resources	Description	Eligible			
		Yes	No	TBD	Used
Community Grants	Emergency Management Performance Grant	X			
	Urban Area Security Initiatives	X			X
	Federal Emergency Management Agency	X			x
	United States Department of Housing and Urban Development- Community Block Grant/Entitlement Grant	X			X
	United States Department of Justice	X			X
	United States Department of Transportation Airport Grants	X			X
	Passed Through Texas Department of Transportation Street Grants	X			X
	Highway Safety Cluster	X			X
	United States Department of Home Security	X			x
	Houston Galveston Area Council	X			X
	Community Block Development Grant	X			X

TBD = To Be Determined

2.6.4 Critical Asset Inventory

Requirement 44 CFR 201.6(c) (2) (ii)(A)(B)

The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area. (B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.

A critical asset is defined as a government asset that provides essential City of Sugar Land services, including government facilities, police departments, fire departments, and emergency medical services. Critical facilities' and infrastructure in Sugar Land are all vulnerable to hazards. The City of Sugar Land identified the facilities in below as critical assets.

**Table 2-5
City of Sugar Land Critical Facilities**

City of Sugar Land Critical Facilities												
Facility/Asset Name or Description and Address	Administration Communication Education Type Fire/Rescue Law Enforcement Medical Type Transportation Utility, etc.	Employee/Visitor Capacity	Time Open	In Hazard	Economic Asset	Historic Asset	Construction B,C,M,W	Emergency Gen.	Square Feet	Structure Value	Content Value	
City Hall	Administration	160	08:00-5:00	HRT	Y	Y	B	Y	85,000-	\$14,925,700	\$1,497,600	
Police / Municipal Court	Law Enforcement	173	08:00-5:00	HR	Y	N	B	Y	56,000	\$9,950,200	\$975,541	
Fire Administration	Emergency Services	37	08:00- 5:00	HR	N	N	B	N	29,866	\$4,023,600	\$100,000	
Fire Station 7	Emergency Services	4	24 Hrs.		N	N	B	Y		\$3,001,300	\$200,000	
Fire Station 6	Emergency Services	6	24 Hrs.	HR	N	N	B	Y	7,650	\$1,315,700	\$95,500	
Fire Station 5	Emergency Services	4	24 Hrs.		N	N	B	Y	7,650	\$1,313,300	\$85,000	
Fire Station 1	Emergency Services	6	24 Hrs.	HR	N	N	B	Y	10,491	\$2,031,200	\$149,500	
Fire Station 2	Emergency Services	6	24 Hrs.	HR	N	N	B	Y	6,440	\$756,900	\$75,000	
Fire Station 4	Emergency Services	4	24 Hrs.	HR	N	N	B	Y	6,030	\$901,400	\$75,000	
Fire Station 3	Emergency services	4	24 Hrs.	HR	N	N	B	Y	5,490	\$778,200	\$75,000	
Airport Terminal	Aviation	15	06:00-10:00	HRT	Y	N	B	Y	19,777	\$3,525,700	\$366,200	
North WWTP Plant Office	Utilities	4	07:00-5:00		N	N	M		3,000	\$600,000	\$8,400,000	
Airport ATC Tower	Aviation	4	06:00- 11:00	TR	N	N	B	Y	2,400	\$563,700	\$150,000	
South WWTP Plant Office	Utilities	2	08:00- 5:00		N	N	B		1,200	\$500,000	\$9,500,000	
Woodchester WTP Office	Utilities	0			N	N	C		1,200	\$300,000	\$2,335,000	
Lakeview WTP Plant Office	Utilities	0			N	N	B		500	\$150,000	\$1,100,000	

City of Sugar Land Critical Facilities											
Facility/Asset Name or Description and Address	Administration Communication Education Type Fire/Rescue Law Enforcement Medical Type Transportation Utility, etc.	Employee/Visitor Capacity	Time Open	In Hazard	Asset				Square Feet	Structure Value	Content Value
					Economic Asset	Historic Asset	Construction B,C,M,W	Emergency Gen.			
First Colony Blvd. WTP Office	Utilities	0			N	N	B		500	\$60,000	\$2,175,000
Sugar Creek WTP Office	Utilities	0			N	N	B		800	\$100,000	\$20,000
Grants Lake off-Site Well	Utilities	0								\$450,000	\$220,000
Laura Rd Off Site Well	Utilities	0								\$600,000	\$220,000

Totals

N = No

WTP = Water Treatment Plant

WWTP = Wastewater Treatment Plant

**Table 2-6
Fort Bend Independent School District Critical Facilities in Sugar Land**

Occupancy	City	2012 Bldg Values	2012 Contents Values
DULLES H.S.	Sugar Land	\$ 55,510,271.00	\$ 4,330,372.80
DULLES H.S. GREENHOUSE	Sugar Land	\$ 47,944.00	\$ 4,794.40
DULLES H.S. FIELD HOUSE	Sugar Land	\$ 1,852,136.00	\$ 185,213.60
DULLES H.S. GREENHOUSE	Sugar Land	\$ 7,592.00	\$ 759.20
TECHNICAL EDUCATIONAL CENTER	Sugar Land	\$ 3,381,872.00	\$ 338,187.20
CLEMENTS H.S. (incl. restroom renovations)	Sugar Land	\$ 54,057,296.00	\$ 3,813,784.00
CLEMENTS SCIENCE CTR (REN.)	Sugar Land		Included
CLEMENTS H.S. AUDITORIUM	Sugar Land	\$ 4,121,520.00	\$ 412,152.00
CLEMENTS H.S. FIELD HOUSE	Sugar Land	\$ 2,008,136.00	\$ 200,813.60
CLEMENTS SPORTS FACILITIES	Sugar Land	\$ 1,048,424.00	\$ 104,842.40

Section 2

Occupancy	City	2012 Bldg Values	2012 Contents Values
KEMPNER H.S. MAIN (incl. interior renovation)	Sugar Land	\$ 52,006,268.00	\$ 3,758,882.40
KEMPNER SCIENCE CTR (REN.)	Sugar Land		Included
KEMPNER SYSTEMS & GRAPHIC	Sugar Land	\$ 682,760.00	\$ 68,276.00
KEMPNER H.S. FIELD HOUSE	Sugar Land	\$ 2,034,656.00	\$ 203,465.60
KEMPNER SPORTS FACILITIES	Sugar Land	\$ 1,048,424.00	\$ 104,842.40
KEMPNER ANIMAL PENS	Sugar Land	\$ 78,123.76	\$ -
AUSTIN H.S. (incl. Science Classroom/Lab Addition, Athletic Field Restroom)	Sugar Land	\$ 47,433,000.00	\$ 3,458,904.80
AUSTIN H.S. GREENHOUSE	Sugar Land	\$ 68,744.00	\$ 6,874.40
AUSTIN H.S. FIELD HOUSE	Sugar Land	\$ 1,630,408.00	\$ 163,040.80
AUSTIN H.S. SPORTS	Sugar Land	\$ 1,048,424.00	\$ 104,842.40
CONCESSION STAND	Sugar Land	\$ 70,928.00	\$ 7,092.80
DULLES M.S.	Sugar Land	\$ 26,905,900.00	\$ 2,066,438.40
DULLES M.S. BAND HALL	Sugar Land	\$ 2,438,845.76	\$ 208,000.00
SUGAR LAND M.S. (incl. Music Area Renovation & Performance Hall Addition)	Sugar Land	\$ 23,806,734.00	\$ 1,720,794.40
WAREHOUSE (SUGAR LAND)	Sugar Land	\$ 461,968.00	\$ 46,196.80
FIRST COLONY M.S. (incl. Clinic Renovation & Restroom @ Administration & CATE)	Sugar Land	\$ 24,684,800.00	\$ 2,184,384.80
GARCIA M.S.	Sugar Land	\$ 27,132,000.00	\$ 2,400,944.00
FORT BEND ADMINISTRATION	Sugar Land	\$ 10,545,808.00	\$ 1,054,580.80
ADMINISTRATION MECH BLDG	Sugar Land	\$ 466,336.00	\$ 46,633.60
WAREHOUSE CENTER	Sugar Land	\$ 5,234,736.00	\$ 1,040,000.00
AG BUILDING	Sugar Land	\$ 194,688.00	\$ 19,468.80
AG BARN (added effective 2/19/10)	Sugar Land	\$ 613,931.76	Included
AG SHED	Sugar Land	Included	Included
LAKEVIEW ELEM MAIN	Sugar Land	\$ 4,471,792.00	\$ 447,179.20
LAKEVIEW AUDITORIUM	Sugar Land	\$ 1,608,464.00	\$ 84,884.80
LAKEVIEW ELEM GYM	Sugar Land	\$ 1,734,200.00	\$ 173,420.00
LAKEVIEW CAFETERIA	Sugar Land	\$ 789,776.00	\$ 78,977.60

Occupancy	City	2012 Bldg Values	2012 Contents Values
LAKEVIEW ELEM PRIMARY	Sugar Land	\$ 1,791,296.00	\$ 179,129.60
LAKEVIEW ELEM DUPLEX	Sugar Land	\$ 204,464.00	\$ 20,446.40
LAKEVIEW ELEM DUPLEX	Sugar Land	\$ 204,464.00	\$ 20,446.40
LAKEVIEW ELEM EXT DAY	Sugar Land	\$ 724,776.00	\$ 72,477.60
WOOD ALTERNATIVE MAIN	Sugar Land	\$ 6,269,432.00	\$ 626,943.20
WOOD ALTERNATIVE GYM	Sugar Land	Included	Included
WOOD ALTERNATIVE DAYCARE	Sugar Land	Included	Included
WOOD ALTERNATIVE MECH BLDG	Sugar Land	Included	Included
DULLES ELEM MAIN	Sugar Land	\$ 9,894,300.00	\$ 812,156.80
TOWNWEST ELEM MAIN (incl. classroom enclosures)	Sugar Land	\$ 9,832,264.00	\$ 731,546.40
TOWNWEST ELEM EXT CARE	Sugar Land	\$ 577,096.00	\$ 57,709.60
COLONY BEND ELEM MAIN (incl. classroom enclosures)	Sugar Land	\$ 9,342,424.00	\$ 740,282.40
COLONY BEND ELEM EXT CARE	Sugar Land	\$ 567,008.00	\$ 56,700.80
SETTLERS WAY ELEM	Sugar Land	\$ 10,188,105.00	\$ 832,696.80
SUGAR MILL ELEM MAIN	Sugar Land	\$ 10,138,768.00	\$ 832,696.80
HIGHLANDS ELEM MAIN	Sugar Land	\$ 9,863,819.00	\$ 776,162.40
HIGHLANDS ELEM EXT-A-CARE	Sugar Land	\$ 494,208.00	\$ 49,420.80
AUSTIN PARKWAY ELEM	Sugar Land	\$ 10,556,070.00	\$ 948,844.00
BARRINGTON ELEM	Sugar Land	\$ 10,556,070.00	\$ 926,900.00
COLONY MEADOWS ELEM	Sugar Land	\$ 10,556,070.00	\$ 928,044.00
WALKER STATION ELEM	Sugar Land	\$ 10,556,070.00	\$ 928,044.00
COMMONWEALTH ELEM	Sugar Land	\$ 10,639,304.00	\$ 1,063,930.40
BRAZOS BEND ELEM	Sugar Land	\$ 10,639,304.00	\$ 1,063,930.40
KEMPNER FOOTBALL STADIUM	Sugar Land	\$ 651,352.00	\$ 65,135.20
KEMPNER BLEACHERS EAST/ PART OF WEST	Sugar Land	\$ 472,368.00	\$ 47,236.80
KEMPNER RESTROOMS	Sugar Land	\$ 235,768.00	\$ 23,576.80
KEMPNER CONCESSIONS	Sugar Land	\$ 66,872.00	\$ 6,687.20

Section 2

Occupancy	City	2012 Bldg Values	2012 Contents Values
KEMPNER RESTROOMS	Sugar Land	\$ 59,800.00	\$ 5,980.00
Kempner Stadium, Lighting and Fencing	Sugar Land	\$ 114,400.00	\$ 11,440.00
WHEELER ATHLETIC COMPLEX	Sugar Land	\$ 4,683,432.00	\$ 468,343.20
MERCER STADIUM	Sugar Land	\$ 6,294,632.00	\$ 582,618.40
MERCER CONCESSION - Northeast	Sugar Land	\$ 246,896.00	\$ 24,689.60
MERCER CONCESSION - Northwest	Sugar Land	\$ 246,896.00	\$ 24,689.60
MERCER CONCESSION - Southeast	Sugar Land	\$ 246,896.00	\$ 24,689.60
MERCER CONCESSION - Southwest	Sugar Land	\$ 246,896.00	\$ 24,689.60
MERCER PRESS BOX	Sugar Land	\$ 135,616.00	\$ 13,561.60
FBISD NATATORIUM	Sugar Land	\$ 10,416,980.00	\$ 968,146.40
FRANKIE BASEBALL STADIUM	Sugar Land	\$ 967,010.00	\$ 89,876.80
FRANKIE PRESS BOX	Sugar Land	\$ 62,920.00	\$ 6,292.00
FRANKIE CONCESSION,GATE, RR	Sugar Land	\$ 151,944.00	\$ 15,194.40
FRANKIE MAINTENANCE	Sugar Land	\$ 134,264.00	\$ 13,426.40
FRANKIE DUGOUTS	Sugar Land	\$ 26,104.00	\$ 2,610.40
TRANSPORTATION WEST	Sugar Land	\$ 1,189,864.00	\$ 118,986.40
TRANSPORTATION FUEL STATION	Sugar Land	\$ 302,640.00	\$ 30,264.00
OYSTER CREEK ELEMENTARY	Sugar Land	\$ 10,967,840.00	\$ 1,096,784.00
ADMINISTRATION ANNEX	Sugar Land	\$ 4,665,336.00	\$ 466,533.60
FORT SETTLEMENT MS	Sugar Land	\$ 28,595,000.00	\$ 2,530,403.20
TEMPORARY BUILDINGS	Sugar Land	\$ 16,055,802.00	\$ 1,605,580.00
SARTARIA MIDDLE SCHOOL	Sugar Land	\$ 28,595,000.00	\$ 2,530,403.20
DRABEK ELEMENTARY	Sugar Land	\$ 11,157,952.00	\$ 1,115,795.20
Cornerstone Elementary	Sugar Land	\$ 11,157,952.00	\$ 1,115,795.20
TOTAL		\$ 630,970,650.28	\$ 53,536,981.60

Figure 2-9
City of Sugar Land Emergency Medical Services (EMS) Location

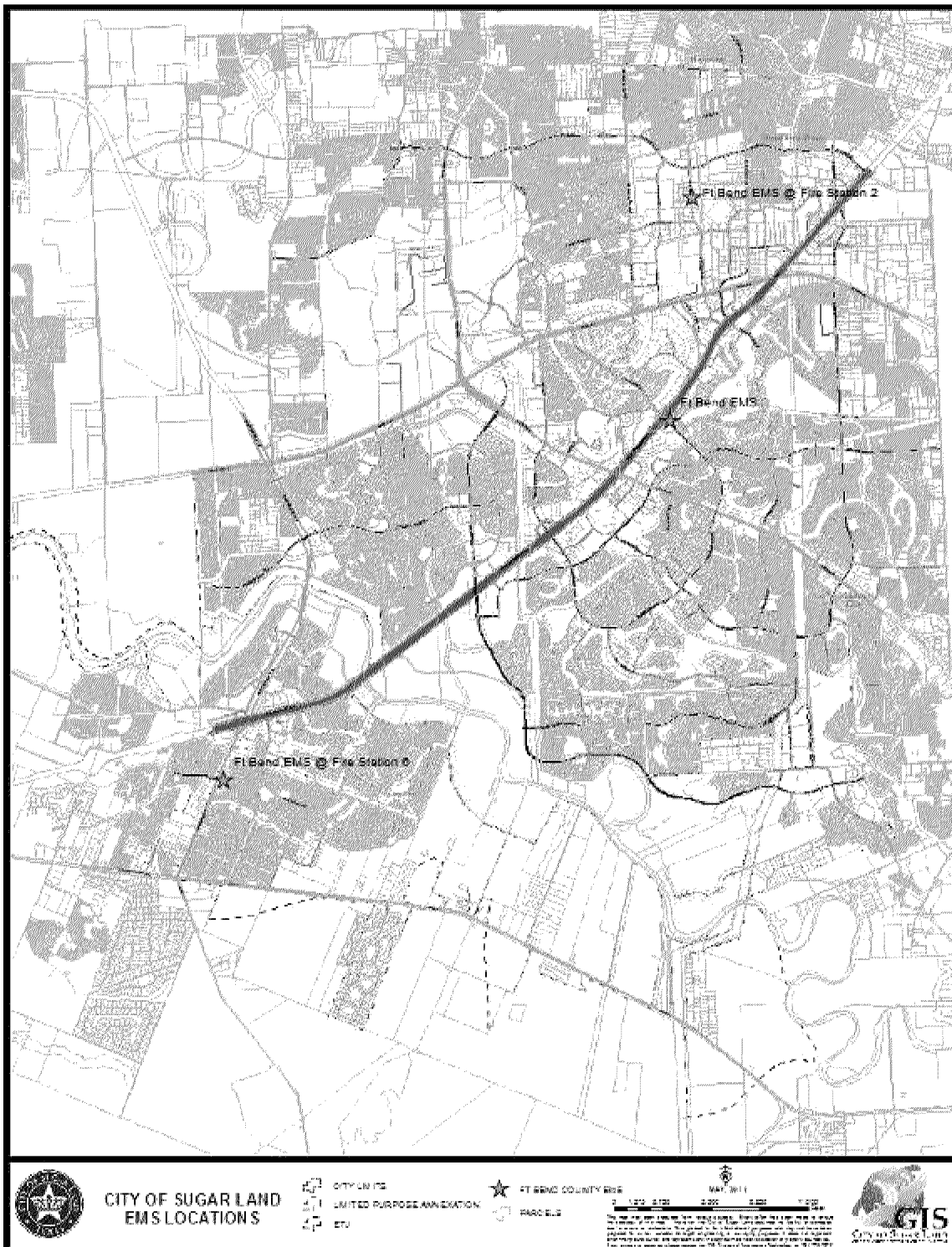


Figure 2-10
City of Sugar Land Fire Station Locations

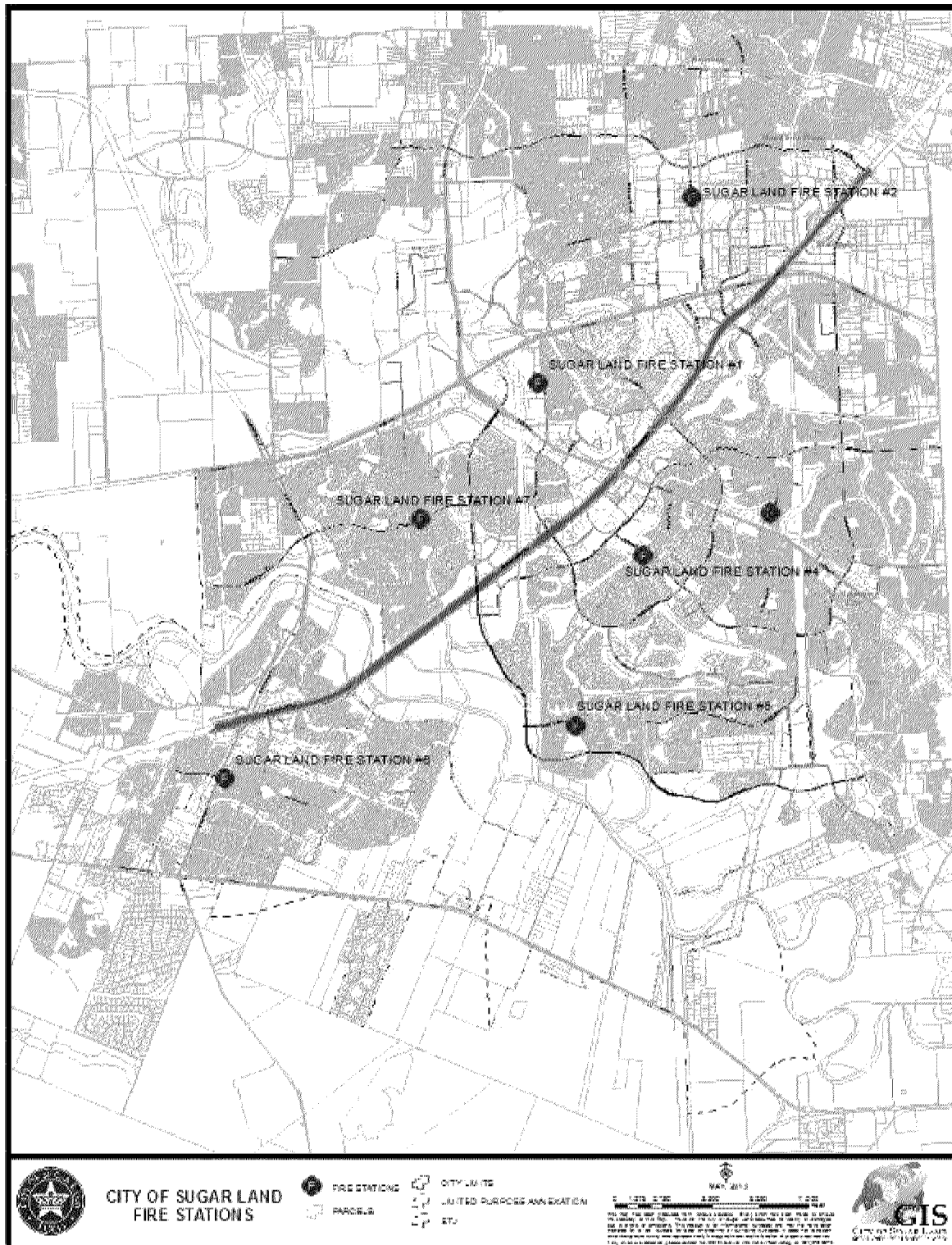
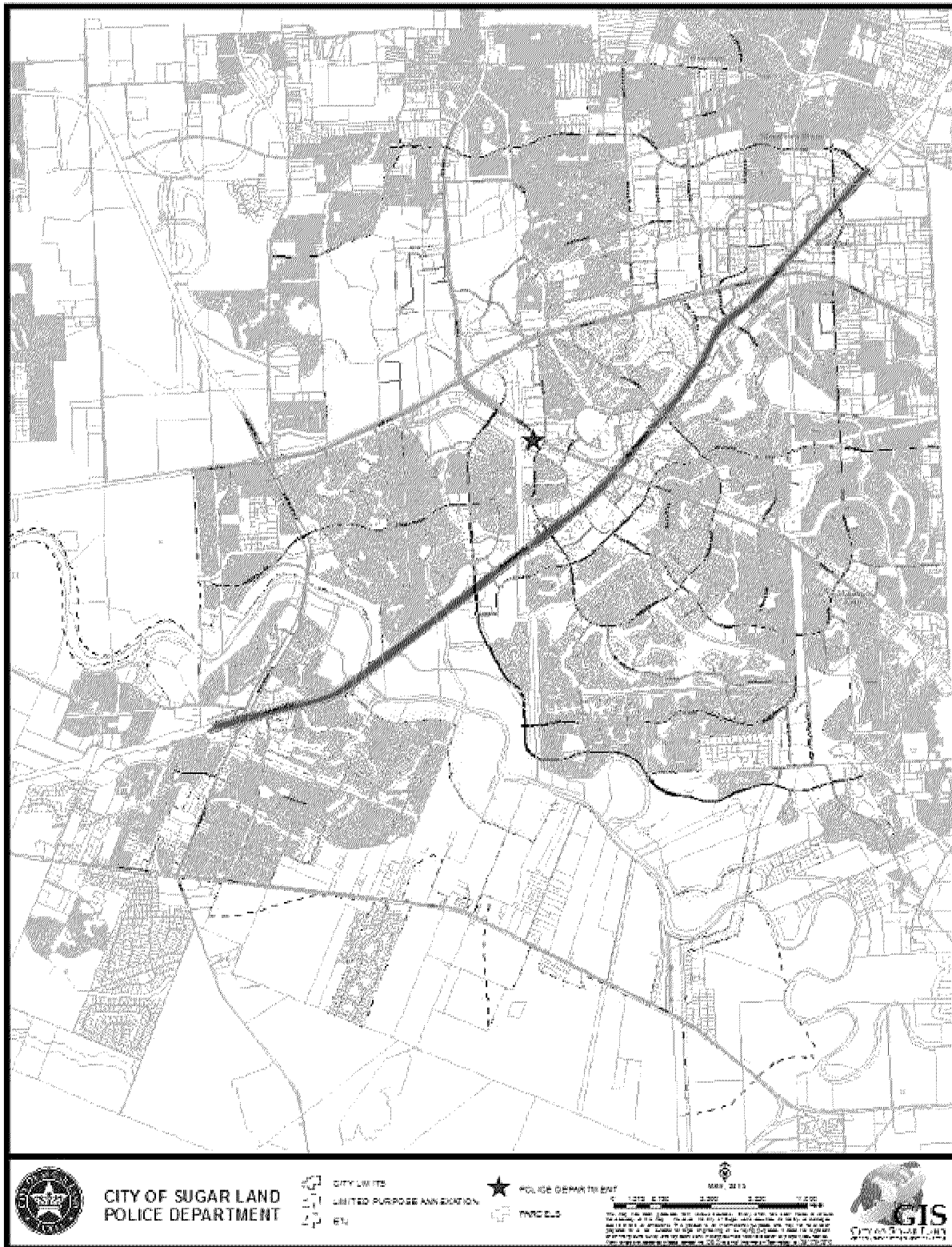


Figure 2-11
City of Sugar Land Police Department



2.7 Government

The City of Sugar Land is organized via a council-manager form of government, the most successful and popular form of government in cities with a population over 10,000. In this government organization, all council members have equal rights; the power is assigned to the council as a whole, as opposed to a single point of power; and the city manager is responsive for providing day-to-day public services to citizens.

The role of the City Council includes appointment a city manager, approving the City budget, establishing City policies, and acting as a legislative body. The role of the City Manager includes appointment and removing employees, enforcing laws and ordinances, making recommendations to the City Council on general welfare of the City, preparing the City budget, and managing all day-to-day affairs.

Figure 2-12
Single Member Council Boundaries in the City of Sugar Land

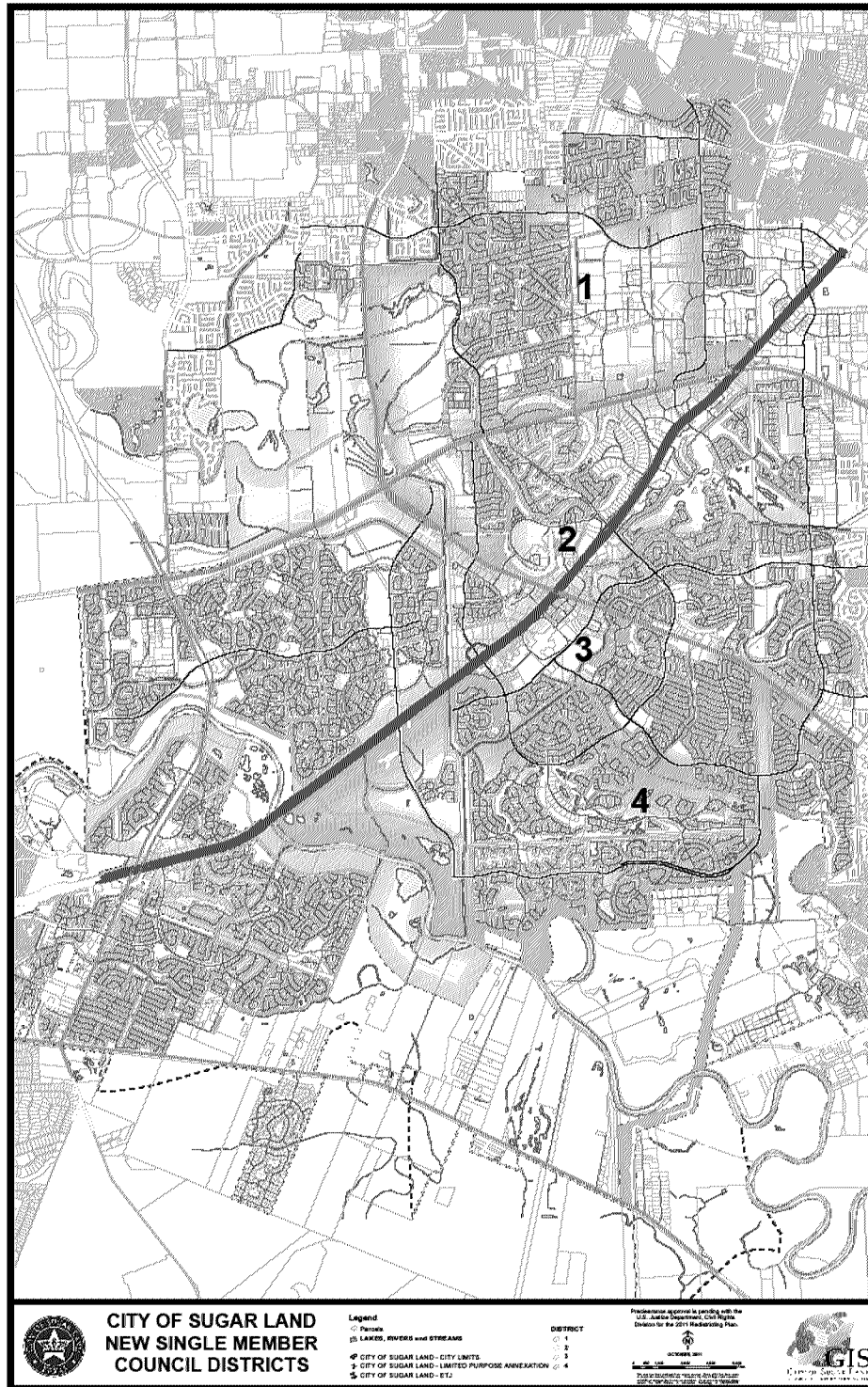


Figure 2-14
City of Sugar Land Area Schools



Section 3

PLANNING PROCESS

Requirement 44 CFR 201.6(c)(1)

The plan shall document the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

3.1 City of Sugar Land Hazard Mitigation Planning Committee

The Department of Emergency Management was tasked with developing the City of Sugar Land Hazard Mitigation Planning Committee (HMPC). The City of Sugar Land HMPC was tasked with the development and completion of the hazard mitigation plan (HMP) as required per state and federal guidelines. The Department of Emergency Management oversaw the project, organized the data, set meeting dates, documented in-kind services, and worked with the Texas Division of Emergency Management to complete this plan. The table below lists the members of the City of Sugar Land Hazard Mitigation Planning Committee.

Table 3-1
City of Sugar Land Hazard Mitigation Planning Committee

Name	Agency	Position
Pat Hughes	City of Sugar Land Emergency Management	Director/Emergency Management Coordinator
Frank Garza	City of Sugar Land Emergency Management	Emergency Management Specialist
Doug Adolph	City of Sugar Land Communications	Assistant Communications Director
David Rider	Chief of Police	Fort Bend County Independent School District
Stuart Denton	City of Sugar Land Police Department	Captain
Bruce McFarland	NALCO	SH&E Superintendent
Dionne Bryant	City of Sugar Land GIS/IT	GIS Specialist
Lisa Kocich-Meyer	City of Sugar Land Transportation and Long Range Planning	Principal Planner
Pat Pollicoff	City of Sugar Land Communications	Director
Howard Christian	City of Sugar Land Utilities	Assistant Director
Stephanie Russell	City of Sugar Land Public Works	Administrative Manager

Name	Agency	Position
Kip L. Hilgers	City of Sugar Land Fire Department	Captain
Joe Anzaldua	EMS	EMS Director/Health Authority
Caroline Egan	Fort Bend County Office of Emergency Management	Planning Coordinator
Doug Schomburg	City of Sugar Land Planning and Code Services	Director
Rob Valenzuela	City of Sugar Land Public Works	Director

Requirement 44 CFR 201.6(b)(2)

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

3.1.1 Additional Partners

The City of Sugar Land HMPC relied on the assistance of various public and private organizations to compile the data, maps, and other vital components of the plan.

A range of stakeholders were invited and encouraged to participate in the development of the HMP. Stakeholder involvement was encouraged through notifications and invitations to agencies and individuals to participate. These included representatives from the City of Sugar Land government, private sector businesses, voluntary agencies, citizens, and Fort Bend County. The City of Sugar Land also engaged the Fort Bend County Independent School District (ISD), to address hazard mitigation in educational facilities located within city boundaries. The ISD is a stakeholder in Sugar Land's Hazard Mitigation Steering Committee (HMSC) and may utilize this HMP to independently seek funding, outside of FEMA Mitigation funds, to procure items outlined in the Mitigation Strategies listed in Table 5-1.

The City of Sugar Land invited representatives of these various agencies to attend public meetings in which to give feedback about the development of the plan. In addition to the mitigation planning committee meetings, the City of Sugar Land encouraged open and widespread participation in the mitigation planning process through the publication of newspaper notices promoting open public meetings. These media advertisements provided local officials, residents, businesses, academia, and other private interests in the City of Sugar Land the opportunity to be involved and offer input throughout the local mitigation planning process.

The City of Sugar Land believes that participation from all levels of government as well as public sector partners is of the utmost importance in hazard mitigation planning. The City of Sugar Land engaged the Fort Bend Independent School District (FBISD) to address hazard mitigation in schools located within city limits. A meeting was held between Pat Hughes, City of

Sugar Land Emergency Manager, and Fort Bend Independent School District representatives to discuss the hazards identified by the Sugar Land HMPC and the participation of the school district. FBISD reviewed its Sugar Land facilities and submitted mitigation strategies to the City for inclusion in the HMP.

The City of Sugar Land ensured that private sector partners were involved in the planning process. For example, NALCO is a major employer in the City of Sugar Land as well as the owners of a chemical plant in the City. The City of Sugar Land HMPC included a representative of NALCO to ensure their full participation. Additionally, the City of Sugar Land asked Armor Glass, a privately owned business in the City, to assist them with determining costs of strengthening and replacing windows throughout City facilities to handle strong winds and bullets, if needed.

Many departments, agencies, and individuals were contacted to provide information as the committee gathered data for capability and vulnerability assessments. These participants played a vital role in the completion of this plan. The following stakeholders were invited to participate in the planning process:

Table 3-2
City of Sugar Land Hazard Mitigation Planning Stakeholders

<u>Agency or Organization</u>	<u>Title of Contact</u>	<u>Method of Contact</u>	<u>Information Provided</u>
Fort Bend Independent School District	Safety Systems Director and Safety Specialist	In person meeting	Provided suggested mitigation projects.
NALCO	Safety, Health and Environmental Superintendent	Email/public meeting	Provided information about the safety mechanisms in place at the NALCO facility.
Texas Division of Emergency Management	District Sub 2 Coordinator	Email	Did not respond.
Armor Glass	President	Public notices - signage in City Hall, Newspaper, and City Web Site.	Attended public meeting #1. Provided input on window protection systems.
Fort Bend County Office of Emergency Management	Regional Planner	Email	Attended public meeting #1. Provided copy of Fort Bend County Hazard Mitigation Plan.
Fort Bend County Health and Human Services	Epidemiologist	Phone	Provided reportable disease information to Leidos.
City of Sugar Land Office of Emergency Management	Emergency Management Coordinator	Email	Provided answers to survey.

Section 3

City of Sugar Land Fire Department	Captain	Email	Provided answers to survey.
City of Sugar Land Health Authority	Health Authority	Email	Provided answers to survey.
General Public	Several Sugar Land residents	Public notices - signage in City Hall, Newspaper, and City Web Site.	Provided answers to online survey
City of Sugar Land Police Department	Captain	Email	Provided answers to survey.
City of Sugar Land Information Technology Department	GIS Specialist	Email	Land use and other maps.
City of Sugar Land Transportation and Long Range Planning	Principle Planner	Email	Comprehensive plan

3.2 Plan Organization

The Hazard Mitigation Planning Committee was responsible for the organization, data collection, and completion of the plan.

The HMPC conducted several meetings and involved all available departments and resources in an effort to gain any information that would increase the effectiveness of the plan.

The HMPC was also tasked with including any external organizations that could benefit from the overall effectiveness of the plan. The HMPC is aware of the importance of including a variety of external and internal organizations. Their input is vital to the short-term and long-term success of the plan. External organizations include but are not limited to Texas Division of Emergency Management, the Federal Emergency Management Agency (FEMA), National Weather Service (NWS), NALCO, Fort Bend Independent School District, Armor Glass, local citizens, other businesses and industry, media outlets, the National Flood Insurance Program representatives, and others. These agencies and organizations were invited to the public meetings, provided information for data collection, and provided feedback on documents throughout the planning process.

The plan is based on the data gathered and identified by all committee members, the public, and all jurisdictions in an effort to prioritize mitigation projects in order of severity in an effort to reduce loss of property and life.

3.3 Planning Team Goals and Objectives

The City of Sugar Land HMPC, early in the process, established a set of goals and objectives to ensure the effectiveness of this plan. These goals and objectives established the paradigm for the planning process. These goals and objectives are as follows:

- Actively involve and gain support from all city and township governments and the City of Sugar Land for the reduction of disasters in our community.
- Prioritize identified mitigation projects.
- Seek and implement any grant funding for the reduction of disasters in the City of Sugar Land and its cities and townships.
- Monitor, evaluate, and update the progress of the plan as needed.
- Form partnerships among local, state, and federal agencies to make the City of Sugar Land more resistant to the effects of disasters.

The following table is the time line agreed upon by the planning team for the development of the City of Sugar Land HMP.

**Table 3-3
Calendar of Events**

Date	Task
April 3, 2013	Kickoff meeting and public meeting of mitigation process
June 17, 2013	Draft risk assessment and mitigation strategies developed
June 20, 2013	Public meeting #2
July 18, 2013	Final mitigation strategy and risk assessment
August 29, 2013	Public meeting #3
September 2013	Draft updated HMP with changes required from public meeting for submittal to Texas Division of Emergency Management and FEMA for official review
October 2013	State review period
November 2013	FEMA review period
December 2013	Final draft updated plan based on State of Texas and FEMA recommendations
January 2014	Final approval obtained from jurisdictions and forwarded to FEMA

FEMA = Federal Emergency Management Agency

HMP = Hazard Mitigation Plan

3.4 Review of Existing Technical/Planning Information

An important aspect of the planning process involved the review of existing federal, state, and local plans, studies, reports, and technical information as well as the ordinances, regulations, and resolutions of each participating jurisdiction for incorporation into the City of Sugar Land HMP. Plans and documents reviewed by various members of the committee include:

State/Federal Data, Reports, and Plans Utilized

- 2011 United States Census Data
 - Information incorporated into Section 2: Community Profile and utilized for analyzing impact of disasters within Sugar Land.
- Texas Department of Natural Resources, water and land cover data
 - Information utilized to identify watersheds and land development trends in Sugar Land.
- National Oceanic and Atmospheric Administration data
 - NOAA data provides the basis for hazard identification in the Sugar Land HMP.
- Special Hazards Event List Database for the United States
 - SHELDUS data provides the basis for hazard identification in the Sugar Land HMP.
- FEMA regulations and guidance
 - FEMA Hazard Mitigation Grant Program guidance provided the framework for information required in the Sugar Land HMP.
- State of Texas HMP
 - Information regarding hazards and State mitigation strategies was incorporated into hazard profiles and mitigation strategies.

County/Regional Plans, Ordinances, Data Utilized

- City of Sugar Land Comprehensive Plan
 - Land development and hazard identification information guided mitigation strategy

Requirement 44 CFR 201.6(b)(3)

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

development in the Sugar Land HMP.

- City of Sugar Land Thoroughfare Master Plan
 - Transportation development and routes were incorporated into vulnerability analysis and helped guide the development of mitigation strategies.
- City of Sugar Land Water Master Plan

- Water infrastructure information was incorporated into the vulnerability analysis and helped guide the development of mitigation strategies.
- City of Sugar Land Geographic Information System User Group Data
 - GIS mapping identified critical infrastructure such as emergency services facilities and power infrastructure. This information was utilized in the development of the vulnerability analysis and mitigation actions.

These documents are on file at the Department of Emergency Management in electronic or hard copy format and provide valuable guidance in the planning process. Some served to acquaint committee members with the many roles of emergency management. Planning guides helped to tie together the phases of mitigation planning for committee members from a broad range of backgrounds outside mitigation and emergency management.

State and federal response and homeland security documents were referenced to ensure the City of Sugar Land's goals supported these plans and promoted compliance with requirements. The State of Texas HMP formed the basis for identifying and analyzing the natural hazards and technological hazards that could affect the City of Sugar Land.

3.5 Public Involvement

To be an effective plan, input from the public is vital. The HMPC recognizes the valuable input that the public can provide on the plan. Additionally, public input builds support, ensures a strong base for future mitigation activities, and allows City of Sugar Land citizens the opportunity to have their interests included in the plan. The public was invited to participate in the development of this plan via the internet and press releases by the Department of Emergency Management.

The main activity for public involvement was invitation to public meetings where they could

Requirement 44 CFR 201.6(b)(1)

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

learn about the hazard mitigation planning process and contribute ideas about the City of Sugar Land's risks, vulnerabilities, and mitigation strategies to the plan.

The first public meeting was held on April 3, 2013. The meeting introduced the hazard mitigation planning process, including the Disaster Mitigation Act of 2000, the importance of public participation, and the overall approach to planning. Complete meeting notes, rosters, and notices can be found in appendix B.

The second meeting, held on June 20, 2013, was an opportunity for attendees to review all hazard profiles, vulnerabilities, and mitigation strategy recommendations. Complete meeting notes, rosters, and notices can be found in appendix B.

A third meeting was held on August 29, 2013 prior to the approval of this plan to present an overview to county residents and solicit input to the final draft. The complete meeting notes, rosters, and notices for this meeting can be found in appendix B.

Section 3

Outreach was conducted for each public meeting. A summary of the type of outreach is below.

Table 3-4
Outreach Conducted for Public Meetings

<u>Event</u>	<u>Outreach Method</u>	<u>Distribution</u>	<u>Date of Contact</u>
Public Meeting #1	Public notices	Signage in City Hall, posting in newspaper, email to key partners, and posting on City of Sugar Land web site.	27-Mar-13
Public Meeting #2	Public notices	Signage in City Hall, posting in newspaper, email to key partners, and posting on City of Sugar Land web site.	5-Jun-13
Public Meeting #3	Public notices	Signage in City Hall, posting in newspaper, email to key partners, and posting on City of Sugar Land web site.	14-Aug-13

Section 4

RISK AND VULNERABILITY ASSESSMENT

Requirement 44 CFR 201.6(c) (2) (ii)

The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement 44 CFR 201.6(c) (2) (i)

The risk assessment shall include a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

4.1 Risk and Vulnerability Assessment Process

The HMPC conducted a comprehensive hazard, risk, and vulnerability assessment of City of Sugar Land.

To develop effective hazard mitigation strategies, it is first necessary to identify and profile all hazards facing the community. The City of Sugar Land Hazard Mitigation Planning Committee (HMPC) conducted a risk assessment of the hazards faced in the community. A risk assessment measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural and technological hazards by assessing the vulnerability of people, buildings, and infrastructure to natural and technological disasters. Several methods were used to identify risks to the community. These methods included evaluating historical data from scientific and news media sources, soliciting opinions and experiences from participating jurisdictions and City of Sugar Land residents, and surveying risks identified in the State of Texas Hazard Mitigation Plan (HMP) that were pertinent to City of Sugar Land.

Following the risk assessment, a vulnerability assessment was conducted by the City of Sugar Land HMPC. The vulnerability assessment predicts the extent of damage that may result from a hazard of a given intensity in a given area on the existing and future build environment. Determining the community's vulnerability involved identifying the threats posed to people, property, and the environment. This also included identifying critical facilities that could be affected by each hazard.

The following natural and technological hazards were identified:

Table 4-1
Hazards Included in the Risk and Vulnerability Assessment

Hazard	Justification for Inclusion
Severe Winter Storms	Frequency, previous incidents, countywide hazard
Severe Thunderstorms	Frequency, previous incidents, countywide hazard
Tornadoes	Frequency, previous incidents, countywide hazard

Section 4

Hazard	Justification for Inclusion
Lightning	Frequency, countywide hazard
Extreme Temperatures	Frequency, countywide hazard
Hailstorms	Countywide hazard
Flooding	Frequency, previous incidents
Drought	Previous incidents, countywide hazard
Hurricanes/Tropical Storms	Frequency, previous incidents
Infectious Disease Outbreak	Previous incidents, potential adverse impact
Dam and Levee Failure	Potential adverse impact
Terrorism	Potential adverse impact
Hazardous Materials Spills	Frequency, previous incidents, countywide hazard
Energy/Fuel Shortage	Frequency, previous incidents, countywide hazard
Aircraft Accidents	Potential adverse impact

The following hazards were not profiled due to geographic location, low occurrence, or low potential for damage.

Table 4-2
Hazards Not Included

Hazard	Justification for Omission
Avalanche	Geographic proximity
Civil Disturbance	Low occurrence, low vulnerability
Coastal Erosion	Geographic proximity
Earthquake	Low occurrence, low vulnerability
Expansive Soils	Low vulnerability
Karst Topography	Low occurrence
Sinkholes	Low vulnerability
Tsunami	Geographic proximity
Wildfires	Low occurrence, low vulnerability due to build out of city and lack of wildland areas.
Volcano	Geographic proximity

The following information was included in each hazard profile:

- **Hazard Identification.** Identification of the hazard will include a description of the hazard and the general threats posed. All hazards were identified using statistical data and records from a variety of sources, including presidential disaster declarations, maps, and hazardous materials response data. The lists of hazards are based on frequency, severity, probability, potential loss, vulnerability, and large-scale effects on the City of Sugar Land.
- **Hazard Profile.** Each hazard will be profiled to explain how it will affect or has affected the City of Sugar Land. This will include areas prone to specific hazards and the effects that they have had on City of Sugar Land infrastructure.

- **Assets Exposed to Hazard.** The risk and vulnerability analysis compares identified hazards with the inventory of affected critical facilities and the effects on the population that is exposed to each hazard. This section will also include a vulnerability assessment for future development, such as schools, water and waste treatment facilities, and other critical infrastructure.
- **Vulnerability.** The city's vulnerability to each hazard will be summarized based on a common set of definitions and classifications used to estimate vulnerability and rank hazards. Figure 4-1 identifies classifications of vulnerability. Each profile was analyzed on the criteria for frequency of occurrence, the amount of warning time prior to the hazard occurring, the amount of area potentially affected by the hazard, and the severity of impact should the hazard occur.

Requirement 44 CFR 201.6(c) (2) (ii)(A)(B)

The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area. (B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.

**Figure 4-1
Hazard Identifications/Classifications**

Frequency of Occurrence: Probability

1 = Unlikely	<1% probability of occurrence in the next 100 years
2 = Occasionally	1–10% probability of occurrence per year, or at least one chance in next 100 years
3 = Likely	>10% but <100% probability of occurrence per year, at least 1 chance in next 10 years
4 = Highly Likely	100% probability of occurrence in a year

Warning Time: Amount of time generally given to alert people to the hazard

1 = More than 12 hours
2 = 6–12 hours
3 = 3–6 hours
4 = None–Minimal

Geographic Extent: Size of the affected area

1 = Localized
2 = Community-wide
3 = Countywide

Potential Impact: Severity and extent of damage and disruption

1 = Negligible	Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries
2 = Minor	Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries
3 = Moderate	Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities
4 = Major	Severe property damage on a metropolitan or regional scale, shutdown of critical

- **Land Use and Development Trends.** This component of the risk and vulnerability analysis will identify land use trends, identify Sugar Land's land use and

44 CFR Requirement 201.6 (c)(2)(ii)(C)

Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

development plans, and reference current plans and regulations that could prevent the impact of the disaster.

- **Hazard Summary.** A summary of the hazard profile will be provided.

4.2 Natural Hazards

Natural hazards, such as floods, tornadoes, and winter storms, are an enduring condition around the human environment. Natural hazards become disasters when they intersect with the human environment. In Texas, natural disasters have had devastating effects on human lives, property, the economy, and the community. While most natural disasters present little danger to human well-being, some develop into hazardous situations that place life, property, economy, and community at higher risk. This section is organized by atmospheric hazards and non-atmospheric hazards.

4.2.1 Severe Winter Storms

Hazard Identification

The City of Sugar Land HMPC researched historical data from the National Climatic Data Center (NCDC) and the National Weather Service (NWS) as well as information from past newspaper articles relating to severe winter storms in the City of Sugar Land. Severe winter storms bring the threat of snow, freezing rain, and ice storms to the City. A heavy accumulation of ice, especially when accompanied by high winds, devastates trees and power lines. Sidewalks, streets, and highways become extremely hazardous to pedestrians and motorists. Severe winter storms originate as mid-latitude depressions of cyclonic weather systems and can cause snowstorms and ice storms. Winter storms can paralyze a city by shutting down normal day-to-day operations and can produce an accumulation of snow and ice on trees and utility lines resulting in loss of electricity and blocked transportation routes. These storms can also lead to frozen water pipes, which when erupted, can lead to extensive property damage and the depletion of a natural resource. Elderly and extremely young populations are more vulnerable to the effects of the extreme temperatures associated with these storms.

Hazard Profile

To determine the City of Sugar Land's vulnerability to severe winter storms, a time period from 2000 to 2013 was examined. Numerous sources were used in identifying the severe winter storm hazards that have occurred in the City of Sugar Land since 2000 (both primary and secondary). Primary sources used included the City of Sugar Land emergency management staff. Secondary sources included the Cable News Network, National Oceanic Atmospheric Agency, NCDC, NWS, the Spatial Hazard Events and Losses Database (SHELDUS), and The Weather Channel.

Research from the SHELDUS and NCDC indicates there have been 11 severe winter storm occurrences recorded for the City of Sugar Land in the past 13 years. Although severe winter storms occur infrequently, they have the potential to wreak havoc on the community when they strike. Statistically, the City of Sugar Land can expect a severe winter storm every three years; this equates to a 15 percent chance of a severe winter storm occurring in any given year. The most recent occurrence was 2009. The 2009 winter storm was a result of an upper level trough of

low pressure coupled with an increase in moisture and unseasonably cold temperatures, which caused accumulations of one to three inches of snow throughout the area.

According to historical records, the City can anticipate the potential for up to three inches of snow and patches of black ice from a severe winter storm. The information presented in the following table presents information for Fort Bend County as identified by SHELDUS and the NCDC. This information demonstrates the potential for winter storms in Sugar Land.

Table 4-3
Severe Winter Storms⁴

Location or County	Date	Type	Deaths	Injuries	Property Damage
Fort Bend	1/9/1962	Winter Weather	0.01	-	\$19,685.54
Fort Bend	12/10/1972	Winter Weather	0.00	0.00	\$196.85
Fort Bend	1/8/1973	Winter Weather	0.00	0.00	\$1,968.50
Fort Bend	3/2/1980	Winter Weather	0.00	0.00	\$0.00
Fort Bend	3/18/1980	Winter Weather	0.00	0.00	\$0.00
Fort Bend	4/14/1980	Winter Weather	0.00	0.00	\$0.00
Fort Bend	2/4/1989	Winter Weather	0.00	-	\$5,681.82
Fort Bend	1/12/1997	Winter Weather	0.13	-	\$34,782.61
Fort Bend (zone)	12/24/2004	Heavy Snow	0	0	\$0
Fort Bend	1/16/2007	-	0.00	0.00	\$2,833.33
Fort Bend (zone)	12/4/2009	Winter Storm	0	0	\$0

Assets Exposed to Hazard

In evaluating assets that may potentially be impacted by the effects of severe winter storms, it was determined that all critical facilities as well as all public, private, and commercial property are vulnerable.

- **Property Risk/Vulnerability.** In evaluating assets that may potentially be impacted by the effects of severe winter storms, all critical facilities as well as all public, private, and commercial properties are vulnerable to the effects of a winter storm. There is a threat of damage to residential and commercial structures due to damaged pipes and the subsequent water damage after the ice in the broken pipes thaw.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a severe winter storm and no way to predict where a storm will occur. People are vulnerable to winter storms through power outages, effects on transportation

⁴ Explanation of Storm Data can be found in appendix C

routes, establishment of shelters, water freezing, etc. People are also vulnerable to the economic threats of winter storms, including the closing of schools and businesses that impact staff availability and revenue streams. The senior citizen population is also vulnerable because of health issues related to loss of heat. Additional vulnerabilities arise from traffic accidents resulting in emergency agencies to respond in austere conditions.

- **Environment Risk/Vulnerability.** Risks to the environment are low for a winter storm. Winter thaw can cause flooding, impacting the environment and possibly creating contamination of potable water for public consumption.

Vulnerability

Severe Winter Storms

Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Minor

Land Use and Development Trends

The City of Sugar Land currently has no land use or development trends related to severe winter storms.

Hazard Summary

Severe winter storms, unlike other natural hazards, typically afford communities some advance warning. The NWS issues winter storm watches, warnings, and advisories as these storms make their way through the City of Sugar Land. Unfortunately, even with advance warning, some of the most destructive winter storms have occurred in Texas and in the southwestern portion of the United States, where buildings, infrastructure, and crops are not typically designed to sustain severe winter conditions. In addition, motorists not accustomed to driving in snow and icy conditions pose an additional danger on roads and highways. The City of Sugar Land HMPC recognized the dangers posed by severe winter storms and identified specific mitigation actions to reduce their impacts.

4.2.2 Severe Thunderstorms

Hazard Identification

The City of Sugar Land HMPC used data from the NCDC, the NWS, and the City of Sugar Land Emergency Management Plan in researching severe thunderstorms and their impact on the City of Sugar Land. Severe thunderstorms include both rain and high winds. Thunderstorm winds are generally short in duration, involving straight-line winds and/or gusts in excess of 50 mph. Thunderstorm winds tend to affect areas of the City of Sugar Land with significant tree stands as well as areas with exposed property and infrastructure and aboveground utilities. Thunderstorm winds can cause power outages, transportation and economic disruptions, and significant property damage and pose a high risk for injuries and loss of life. Thunderstorm winds are measured according to the Beaufort Wind Scale, which is provided below.

Table 4-4
Beaufort Wind Scale⁵

Force	Speed		Description	Specifications for use at sea
	(mph)	(knots)		Specifications for use on land
0	0-1	0-1	Calm	Sea like a mirror
				Calm; smoke rises vertically
1	1-3	1-3	Light Air	Ripples with the appearance of scales are formed, but without foam crests
				Direction of wind shown by smoke drift, but not by wind vanes
2	4-7	4-6	Light Breeze	Small wavelets, still short, but more pronounced; crests have a glassy appearance and do not break
				Wind felt on face; leaves rustle; ordinary vanes moved by wind
3	8-12	7-10	Gentle Breeze	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered whitecaps
				Leaves and small twigs in constant motion; wind extends light flag
4	13-18	11-16	Moderate Breeze	Small waves, becoming larger; fairly frequent whitecaps
				Raises dust and loose paper; small branches are moved
5	19-24	17-21	Fresh Breeze	Moderate waves, taking a more pronounced long form; many whitecaps formed
				Small trees in leaf begin to sway; crested wavelets form on inland waters
6	25-31	22-27	Strong Breeze	Large waves begin to form; white foam crests are more extensive everywhere
				Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty
7	32-38	28-33	Near Gale	Sea heaps up; white foam from breaking waves blows in streaks along the direction of the wind
				Whole trees in motion; inconvenience felt when walking against the wind
8	39-46	34-40	Gale	Moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks along the direction of the wind
				Breaks twigs off trees; generally impedes progress
9	47-54	41-47	Severe Gale	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble, and roll over; spray may affect visibility
				Slight structural damage occurs (chimney-pots and slates removed)

⁵ Source: National Weather Service, <http://www.nws.noaa.gov/>

Section 4

Force	Speed		Description	Specifications for use at sea
	(mph)	(knots)		Specifications for use on land
10	55-63	48-55	Storm	Very high waves with long overhanging crests; resulting foam, in great patches, blows in dense white streaks along the direction of the wind; on the whole the surface of the sea takes on a white appearance; the tumbling of the sea becomes heavy and shock-like; visibility affected Seldom experienced inland; trees uprooted; considerable structural damage occurs
11	64-72	56-63	Violent Storm	Exceptionally high waves (small and medium-size ships might be for a time lost to view behind the waves); the sea is completely covered with long white patches of foam lying along the direction of the wind; everywhere the edges of the wave crests are blown into froth; visibility affected Very rarely experienced; accompanied by widespread damage
12	72-83	64-71	Hurricane	The air is filled with foam and spray; sea completely white with driving spray; visibility very seriously affected See Saffir-Simpson Hurricane Scale.

Hazard Profile

The most prevalent natural hazard incident occurring in the City of Sugar Land is severe thunderstorms and the winds from these thunderstorms. During the spring and summer months, the City of Sugar Land typically experiences countless thunderstorms, some with significant winds. Over the course of the past 13 years, 42 severe thunderstorm wind incidents have been recorded within Fort Bend County; 18 of these storms impacted the City of Sugar Land. On average, at least one thunderstorm each year produces winds strong enough to inflict significant property damage. A review of historical weather data indicates there is a very significant chance of severe thunderstorm winds impacting the City of Sugar Land each year. Severe thunderstorm winds occur more frequently than any other natural hazard incident within the City of Sugar Land.

One severe thunderstorm/high wind incident occurred on May 8, 2005, when high winds downed power lines and trees in the Pecan Grove area, resulting in approximately \$17,000 in property damages. Severe thunderstorms have historically caused much more damage in the City of Sugar Land, though. In 2000, high winds from a severe thunderstorm caused approximately \$150,000 in damages to a recreational vehicle park at U.S. Highway 59 and Crabb River Road. The storm downed numerous power lines; damaged several trailers; and downed signs, fences, and awnings within the City of Sugarland. The storm also produced damaging hail, causing approximately \$10,000 in damages at the Sugar Land Airport. Another severe thunderstorm that caused significant damage occurred in 2007 when storms significantly damaged a Sugar Land mobile home park. The damage inflicted on the mobile home park, a resident's barn, and the numerous power poles blown down by the incident was estimated at \$25,000.

The City of Sugar Land has experienced the full range of thunderstorm effects varying from gale force winds around 39 miles per hour to violent storm winds at or above 72 miles per hour. The information presented in the following table presents information for Fort Bend County and Sugar Land as identified by SHEL DUS and the NCDC. This information demonstrates the potential for severe thunderstorms and winds in Sugar Land.

Table 4-5
Thunderstorms and High Winds⁶

Location or City	Date	Time	Type	Magnitude	Death	Injuries	Property Damage
Sugar Land	7/23/2000	1540	Thunderstorm/ Wind	0 knots	0	0	\$200,000
Sugar Land	11/12/2000	1845	Thunderstorm/ Wind	0 knots	0	0	\$150,000
Fort Bend	4/16/2001	1545	Thunderstorm/ Wind	-	0	0	\$1,000,000
Sugar Land	9/20/2001	1815	Thunderstorm/ Wind	-	0	0	\$2,000
Sugar Land	6/29/2002	1122	Thunderstorm/ Wind	-	0	0	\$20,000
Sugar Land	8/3/2002	1530	Thunderstorm/ Wind	-	0	0	\$2,000
Sugar Land	12/23/2002	2117	Thunderstorm/ Wind	52 knots EG	0	0	\$1,000
Sugar Land	2/24/2005	0700	Thunderstorm/ Wind	60 knots EG	0	0	\$15,000
Sugar Land	5/8/2005	1544	Thunderstorm/ Wind	55 knots EG	0	0	\$12,000
Sugar Land	5/8/2005	1612	Thunderstorm/ Wind	55 knots EG	0	0	\$5,000
Sugar Land	3/31/2007	0530	Thunderstorm/ Wind	52 knots EG	0	0	\$0
Sugar Land	5/03/2007	-	Thunderstorm/ Wind	-	0	0	\$25,500
Sugar Land	6/15/2007	1500	Thunderstorm/ Wind	52 knots EG	0	0	-
Sugar Land	6/17/2008	-	Thunderstorm/ Wind	-	0	0	\$9,000
Sugar Land	2/11/2009	0056	Thunderstorm/ Wind	51 knots MG	0	0	-
Sugar Land	8/23/2010	1701	Thunderstorm/ Wind	50 knots EG	0	0	-
Fort Bend	6/5/2011	1655	Thunderstorm/ Wind	53 knots	0	1	\$3,000
Fort Bend	6/6/2011	1530	Thunderstorm/ Wind	50 knots	0	0	\$500

⁶ Source: National Climatic Data Center: <http://www.ncdc.noaa.gov/oa/ncdc.html>

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** In evaluating assets that are vulnerable to severe thunderstorms, it was determined that all critical facilities as well as all public, private, and commercial properties are vulnerable to severe thunderstorms. Potential damage from wind may cause roof and window damage. Rising waters may cause roof leaks and flood low lying areas in the Sugar Land area. In addition, flying debris, as a result of high winds from a severe thunderstorm, can damage power lines, and power poles, resulting in widespread power outages.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a severe thunderstorm and no way to predict where a storm will occur. People are vulnerable to severe thunderstorms through power outages, effects on transportation routes, establishment of shelters, roofs blown off structures, etc. Injuries and death are possible from traffic accidents, and injuries sustained from wind-blown debris. Severe thunderstorms occur frequently in the City of Sugar Land. Individuals dependent on electrical breathing equipment, or other medical equipment such as dialysis, are vulnerable to the effects of severe thunderstorms and the subsequent power outages that are likely to occur.
- **Environment Risk/Vulnerability.** Risks to the environment are high for a severe thunderstorm. High winds can destroy trees, and flooding from severe thunderstorms may destroy forestry and re-direct river flow causing damages.

Vulnerability

Severe Thunderstorms

Frequency of Occurrence	Highly Likely
Warning Time	3–6 hours
Geographic Extent	Community-wide
Potential Impact	Moderate

Land Use and Development Trends

The City of Sugar Land currently has no land use or development trends related to severe thunderstorm winds.

Hazard Summary

Overall, severe thunderstorm winds pose one of the greatest threats to the City of Sugar Land in terms of property damage as well as injuries and loss of life. Severe thunderstorm winds are the most frequently occurring natural hazard in the City of Sugar Land and have the greatest chance of affecting the City of Sugar Land each year. Based on the frequency of this hazard, as well as its ability to negatively affect the City of Sugar Land, the mitigation measures identified in this plan should be aggressively pursued. Specific mitigation actions related to severe thunderstorm winds are identified in Section 5 of this plan.

4.2.3 Lightning

Hazard Identification

The City of Sugar Land HMPC researched historical data from the NCDC and the NWS as well as information from past newspaper articles relating to lightning strikes in the City of Sugar Land. By definition, all thunderstorms are accompanied by lightning. The electrical charge from lightning can potentially be as much as 100 million volts. Lightning strikes proceed from cloud to cloud, cloud to ground, or where high structures are involved, from ground to cloud. Lightning strikes in the City of Sugar Land are most prevalent in May, with August being the next month of highest occurrence.

Hazard Profile

Lightning, as with many natural hazards, can strike anywhere and at any time. Data from NCDC reported one incident of a lightning strike in the City of Sugar Land since 2000; however, local knowledge indicates many more instances. The most severe lightning incident in the City of Sugar Land occurred on July 23, 2003, when a group of three individuals installing a chain link fence took shelter under a tree during a fast approaching storm and were struck by lightning. This incident resulted in one fatality and two injuries. Another lightning strike occurred during a severe thunderstorm in October 2002. The lightning affected multiple facilities, causing over \$28,000 in damage.

The City of Sugar Land can expect lightning strikes with charges as high as 100 million volts. Based on historical records, the City of Sugar Land may experience damage to critical infrastructure and facilities ranging from \$5,000 to \$500,000 as a result of lightning.

Table 4-6
Lightning

Location or County	Date	Time	Type	Magnitude	Death	Injuries	Property Damage
Sugar Land	10/7/2002		Lightning	N/A	0	0	28,000
Sugar Land	7/23/2003	1245	Lightning	N/A	1	2	-

In addition to the two incidences of damage and injury due to lightning listed above, there are also several incidences of lightning strikes to individual homes in Sugar Land causing property damage. It is not unusual for the Sugar Land fire department to experience a spike in calls for assistance during or immediately following a lightning storm.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** The Sugar Land HMPC determined that all critical facilities, as well as all public, private, and commercial properties, are vulnerable to lightning incidents. Property is vulnerable to lightning due to fire hazards.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact or magnitude of a lightning incident and no way to predict where a lightning incident will occur. People are vulnerable to lightning incidents through power outages, effects on

transportation routes, establishment of shelters, being struck by lightning, etc. People are also vulnerable to falling tree limbs and fires caused by lightning.

- **Environment Risk/Vulnerability.** Risks to the environment include the risk of fire to homes and businesses.

Vulnerability

Lightning Strikes

Frequency of Occurrence	Occasionally
Warning Time	None
Geographic Extent	Localized
Potential Impact	Minor

Land Use and Development Trends

The City of Sugar Land does not currently have land use or development trends related to lightning.

Hazard Summary

Lightning strikes, although rare in occurrence, have a high danger potential associated with them. Lightning, as with some of the other natural hazards typical to the City of Sugar Land, can strike anywhere and at any time. Its unpredictability along with its deadly and destructive potential is all the more reason to explore mitigation actions. The City of Sugar Land HMPC identified specific mitigation goals, objectives, and action items related to lightning strikes.

4.2.4 Extreme Temperatures

Hazard Identification

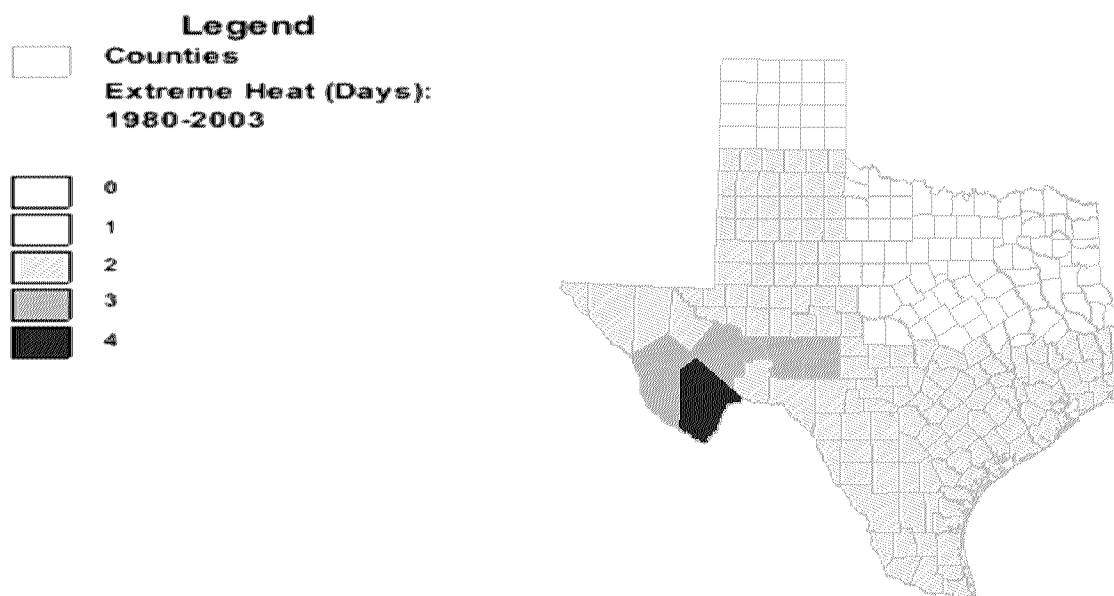
Extreme temperatures include both cold and hot incidents, which can have a significant impact on human health, commercial/agricultural businesses, and primary and secondary effects on infrastructure (for example, burst pipes and power failure). What constitutes “extreme cold” or “extreme heat” can vary across different areas of the country based on what the population is accustomed to in their respective climates.

What constitutes extreme cold and its effects can vary across the state of Texas. The City of Sugar Land typically does not experience extreme cold, but history has shown that the City of Sugar Land is not immune to extreme cold temperatures.

Temperatures that hover 10 degrees or more above the average high temperature for a region and last for several weeks are defined as extreme heat by the Center for Disease Control. Extreme temperatures are very common across the state of Texas.

Figure 4-2

Extreme Heat in Texas



Hazard Profile

The growing season in Fort Bend County is 296 days, with an average annual rainfall of 45.3 inches. The average first freeze date in the fall is December 7, and the average last freeze date is February 14. Temperatures range from a mean minimum in January of 41° to a mean maximum in July of 93°. The Gulf of Mexico is located only 50 miles from Fort Bend County and its close proximity helps to hold the summer and winter temperatures to moderate levels. Extremes in climatic changes are usually short in duration.

The City of Sugar Land has experienced eight extreme heat incidents in the past 13 years, resulting in a 61% chance of an extreme heat incident occurring every year.

The most severe extreme temperature incident to impact the City of Sugar Land occurred in July 1980, when the entire Houston area experienced 14 straight days with a minimum temperature of 100 degrees Fahrenheit or higher. This incident caused 107 deaths statewide.

The entire city is at risk of extreme temperature incidents. Extreme temperatures affect the City of Sugar Land equally and uniformly. The information presented in the following table presents information for Fort Bend County as identified by SHELDUS and the NCDC. This information demonstrates the potential for extreme temperatures in Sugar Land.

Table 4-7
Extreme Temperatures Incidents⁷

Location or City	Date	Type	Death	Injuries	Property Damage
Fort Bend (zone)	7/1/1980	Heat	0	1.06	\$5,319.15
Fort Bend (zone)	7/21/1995	Heat	0.09	9.09	-

⁷ Source: National Climatic Data Center, <http://www.ncdc.noaa.gov/oa/ncdc.html>

Section 4

Location or City	Date	Type	Death	Injuries	Property Damage
Fort Bend (zone)	7/6/2000	Heat	0	0	-
Fort Bend (zone)	8/29/2000	Heat	0	0	-
Fort Bend (zone)	9/1/2000	Heat	0	0	-
Fort Bend (zone)	6/24/2009	Heat	0	0	-
Fort Bend (zone)	7/4/2009	Heat	0	0	-
Fort Bend (zone)	7/9/2009	Heat	0	0	-

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities as well as all public, private, and commercial properties are vulnerable to being affected by extreme temperatures; however, the risk is very low. Extreme cold may freeze water pipes, causing significant issues for a facility. Extreme heat may affect power supply to a facility. There is also potential foundation structural damage from shifting soils.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of an extreme temperature incident and no way to predict where and when an extreme temperature incident will occur. People are vulnerable to the effects extreme temperatures, including power outages, effects on transportation routes, establishment of shelters, etc. Those with existing medical conditions, such as lung or heart disease, are affected by extreme temperatures and the elderly population, small children, and those that work outdoors may be at higher risk.
- **Environment Risk/Vulnerability.** Risks to the environment are high should an extreme temperature incident occur, and the frequency of extreme temperatures in the City of Sugar Land is high. Environmental concerns include interruption of water supply (for example, water pipes freezing and frozen tree branches) and secondary incidents such as fires and hazardous materials accidents. Extreme heat may be a significant factor in causing droughts.

Vulnerability

Extreme Temperatures

Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Negligible

Land Use and Development Trends

There are no future development trends in the City of Sugar Land that will be affected by extreme temperatures.

Hazard Summary

Extreme temperatures have occurred across the entire City of Sugar Land. Extreme temperature effects are seen in different regions and vary depending on normal meteorological conditions such as either extreme heat or extreme cold. Extreme temperatures are possible throughout the planning area, with the southern portion of the state being more probable for extreme heat temperatures during the summer months of the year.

4.2.5 Hailstorms

Hazard Identification

Hail is a form of precipitation composed of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5-50 mm in diameter on average, with much larger hailstones forming in severe thunderstorms. The size of hailstones is a direct function of the severity and size of the storm. Hailstones are classified by size according to the Tornado and Storm Research Organization Hail Storm Intensity Scale, which is provided in Table 4-8.

Table 4-8
Tornado and Storm Research Organization Hail Storm Intensity Scale

Intensity Category		Typical Hail Diameter (mm) [*]	Probable Kinetic Energy, J-m ²	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		Severe damage to aircraft bodywork (severest recorded in the British Isles)
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Hazard Profile

The City of Sugar Land has experienced 10 hail incidents over the past 13 years. This correlates to a 69% chance that the City of Sugar Land will be impacted by a hail incident each year. The

Section 4

greatest impact to the City of Sugar Land resulting from hail occurred in 2002, when hailstones reaching 1.75 inches in diameter caused \$20,000 in property damage.

Recently, the City of Sugar Land experienced a significant hail incident. On April 28, 2013, the weight of hail and a heavy rain storm caused a local gas station convenience store roof to collapse. Fortunately, no one was injured. The hailstorm also caused minor damage to many cars, roofs, and other property within the Sugar Land area.

Most of the United States, including Texas, experience hailstorms at least two or more days each year. Long-stemmed vegetation and structures are particularly vulnerable to damage by hail impacts and winds. The land area affected by individual hail incidents is not much smaller than that of a parent thunderstorm, an average of 15 miles in diameter around the center of a storm. The entire City of Sugar Land is vulnerable to a hail incident.

Table 4-9
Hail Incidents⁸

Location or City	Date	Type	Magnitude	Death	Injuries	Property Damage
Sugar Land	11/12/2000	Hail	0.75 in.	0	0	\$15,000
Sugar Land	4/16/2001	Hail	0.75 in.	0	0	\$20,000
Sugar Land	3/30/2002	Hail	1.75 in.	0	0	\$20,000
Sugar Land	4/7/2003	Hail	0.75 in.	0	0	\$4,000
Sugar Land	4/10/2004	Hail	1.0 in.	0	0	\$20,000
Sugar Land	2/24/2005	Hail	0.88 in.	0	0	\$4,000
Sugar Land	5/8/2005	Hail	0.75 in.	0	0	\$7,000
Sugar Land	6/17/2008	Hail	0.75 in.	0	0	\$9,000
Sugar Land	3/26/2009	Hail	0.88 in.	0	0	-
Sugar Land	4/28/2013	Hail	-	-	-	-

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities as well as all public, private, and commercial properties are vulnerable to being affected by a hailstorm. Outdoor facilities, such as public parks, are more vulnerable to hail damage than other facilities. Additionally, vehicles parked outdoors are particularly vulnerable to hail damage and could increase the economic impact of a storm. In particular, roof damage, as well as damage to sky lights, windows, and air conditioning systems is also a risk of hail.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a hailstorm incident and no way to predict where and when a hailstorm

⁸ Source: National Climatic Data Center, <http://www.ncdc.noaa.gov/oa/ncdc.html>

will occur. People are vulnerable to the effects of hailstorms, including injuries, power outages, effects on transportation routes, damage to homes and cars, etc. First responders are also at risk of being injured during a significant hailstorm.

- **Environment Risk/Vulnerability.** Hail can significantly impact the environment in rural areas due to damaged crops; however, Sugar Land is an urban area that faces a low risk from hailstorms.

Vulnerability

Hailstorms	
Frequency of Occurrence	Likely
Warning Time	3-6 hours
Geographic Extent	Community-wide
Potential Impact	Minor

Land Use and Development Trends

Future development throughout the City of Sugar Land will be vulnerable to potential property damage from hailstorms because no property is immune to a hailstorm’s effects. However, there are currently no land use or development trends related to hailstorms.

Hazard Summary

The severity of hailstorms is measured by duration, size of the hail itself, and geographic extent. All of these factors are directly related to the weather phenomena that create hail and thunderstorms. The size of the hail is a direct function of the severity and size of the storm. The duration of each storm varies but rarely longer than a couple of hours.

Once a hailstone reaches the size of about 1.5 inches in diameter, damage to cars, windows, and siding will occur. There are no known instances of injuries or death from hail incidents in the City of Sugar Land. Although typically not life threatening, severe hailstorms have the potential to cause significant property damage, particularly to automobiles and some building types. The development of hailstorms from thunderstorm incidents causes nearly \$1 billion in property and crop damage each year.

4.2.6 Flooding

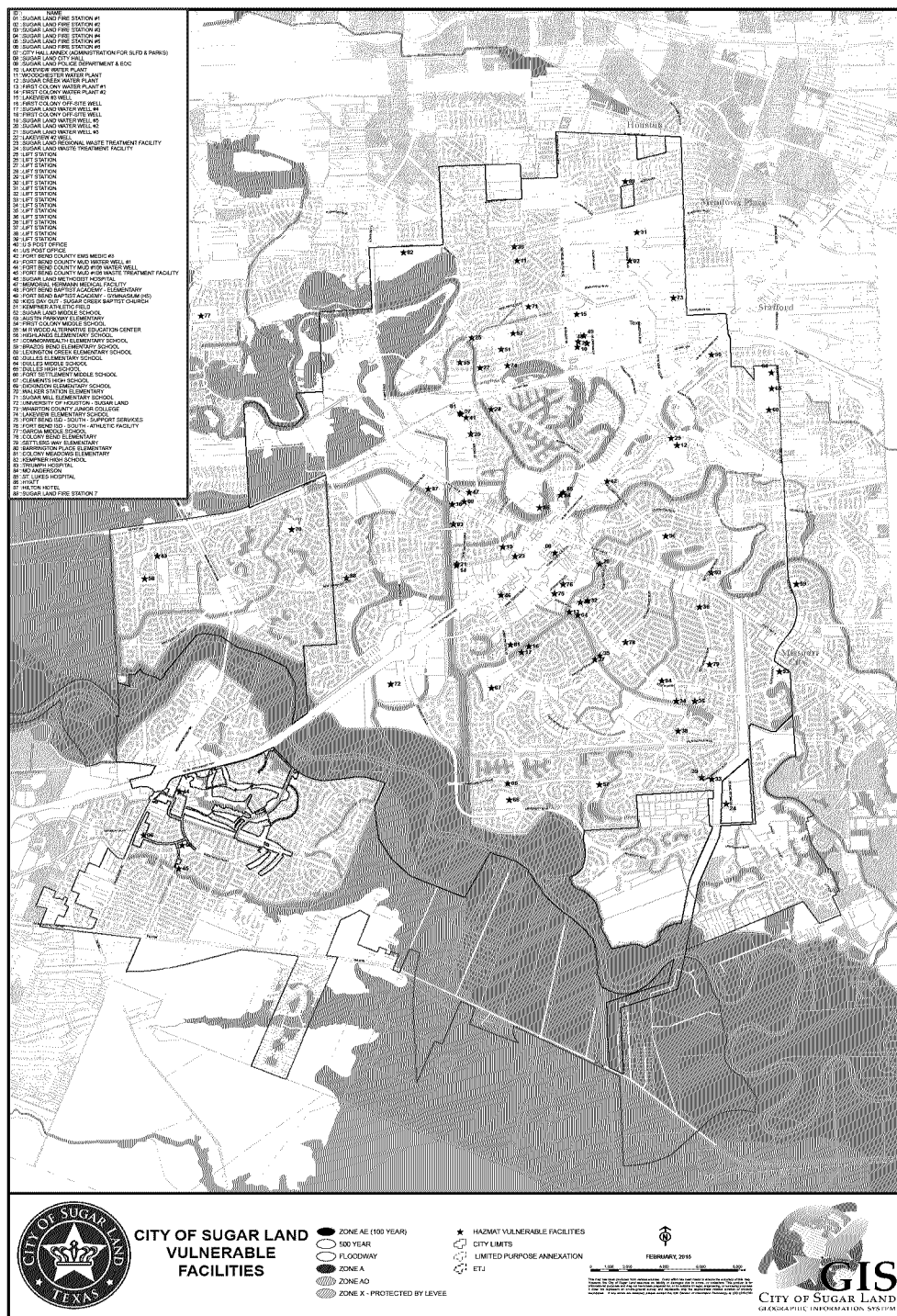
Hazard Identification

Overflow of rivers and streams due to severe storms or torrential rains may result in significant flooding. Different variables impact flooding, including topography, ground saturation, previous rainfall, soil types, drainage, basin size, drainage patterns of streams, and vegetative cover. Flooding may occur slowly or become a flash flood, such as in the case of a dam failure. The City of Sugar Land HMPC researched historical data from the NCDC, the NWS, FEMA, and the National Flood Insurance Program (NFIP) as well as information from past newspaper articles relating to flooding in the City of Sugar Land.

Hazard Profile

Research indicates that there have been six flood occurrences recorded for the City of Sugar Land and the surrounding area since 2000. Although flooding occurs infrequently, it has the potential to wreak havoc on the community. Statistically, Sugar Land can expect flooding every 2.5 years. This equates to a 38 percent chance of flooding occurring in any given year. Figure 4-3 shows the flood zones within the City of Sugar Land as well as the location of critical facilities within the City.

4-19



In 2001, a flooding incident occurred as the remnants of Tropical Storm Allison passed through the area, leading to street flooding as well as water accumulation in some homes in the Sugar Creek subdivision. Prior to Tropical Storm Allison making landfall, the City experienced 12 inches of rain. The additional water caused many residents to be trapped in their homes, needing rescue from the fire department. The storms also produced three tornadoes, causing minor damage and no injuries. In terms of extent, the City of Sugar Land may anticipate the potential for flood depths in the range of one inch to five feet.

In 2012⁹, a flooding incident affected multiple points in the City of Sugar Land. A severe thunderstorm poured over 6 inches of rain on the City of Sugar Land, overwhelming water pumps at key intersections and underpasses throughout the City. The underpass at Grand Parkway was flooded due to these issues, and five people were injured in the storm.

These significant flood incidents as well as others are listed below. The information presented in the following table presents information for Fort Bend County and Sugar Land as identified by SHELDUS and the NCDC. This information demonstrates the potential for flooding in Sugar Land.

Table 4-10
Significant Floods Incidents

Location	Date	Type	Magnitude	Death	Injuries	Property Damage
East Portion	6/7/2001	Flash Flood	N/A	0	0	0
East Portion	6/8/2001	Flash Flood	N/A	0	0	0
East Portion	6/9/2001	Flash Flood	N/A	0	0	0
Fort Bend	8/30/2001	Flash Flood	N/A	0	-	\$50,000
Sugar Land	2/24/2005	Flash Flood	N/A	0	0	0
Sugar Land	01/09/2001	Flash Flood	-	0	5	-

To provide a sense of the flood risk in a community, it is beneficial to summarize the policies in force and claims statistics from the NFIP. The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. The City of Sugar Land has been a member of the NFIP since 1974.

⁹ Information regarding the 2012 event was not available in SHELDUS or NCDC at time of print.

FEMA NFIP statistics indicate that as of November 2010, federal flood insurance policies were in force on 3,757 buildings in the City of Sugar Land. This represents a dollar value of property

44 CFR Requirement 201.6 (c)(2)(ii)

The risk assessment **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

and contents coverage totaling \$1.1 billion. Between 1981 and 2010, there have been a total of 188 NFIP insurance claims in the City of Sugar Land with a total claims value of \$697,678.

The City of Sugar Land is also a member of the Community Rating System (CRS), a voluntary program for communities participating in the NFIP. The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. For CRS participating communities, flood insurance premium rates are discounted in increments of 5 percent based on 18 creditable activities. CRS communities are ranked between 1 and 10, with Class 1 communities receiving a 45 percent premium discount. The City of Sugar Land joined the program in May 2010 and entered into the CRS as a Class 7 community based on its higher regulatory standards, public education outreach, flood alert system, flood map information services, and other initiatives. The City of Sugar Land will continue to comply with NFIP requirements by enforcing floodplain management regulations, ensuring new buildings are constructed with methods that minimize flood damage, and by reviewing any development projects for possible impacts to floodplain management.

Repetitive Loss Properties

Repetitive loss properties are a serious concern from a mitigation standpoint. A repetitive loss property is considered so when there are two or more flood insurance claims that were paid more than \$1,000 for each loss. The losses must be within 10 years of each other and must be at least 10 days apart. A property is considered a severe repetitive loss property when there are at least four losses (each exceeding \$5,000), or when there are two or more losses where the building payments exceed the property value.

The City of Sugar Land has seven repetitive loss properties as defined above. They are listed below.

Table 4-11
Repetitive Loss Properties in the City of Sugar Land

Community Name	Mitigated?	Insured?	Address Line 2	Zone	Firm	Building Value
SUGAR LAND, CITY OF	NO	NO	3018 S BLUE MEADOW CIR	C	N	45,000
SUGAR LAND, CITY OF	NO	NO	3010 FRONTIER DR	EMG	N	90,000
SUGAR LAND, CITY OF	NO	NO	13502 LYNNWOOD LN	C	N	97,200
SUGAR LAND, CITY OF	NO	NO	2610 COUNTRY CLUB BLVD	X	N	75,000
SUGAR LAND, CITY OF	NO	NO	13439 PARKWAY BLVD # 5	X	N	102,707
SUGAR LAND, CITY OF	NO	YES	518 ALKIRE LAKE DR	X	N	250,000

Section 4

SUGAR LAND, CITY OF NO YES 13623 ELM CT X N 147,819

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** All properties within a floodplain have an increased chance of flooding. The vulnerability of these structures is very high, depending on the probability of that area flooding within a 10-year or 100-year period.
- **People Risk/Vulnerability.** People living in and around identified floodplain areas are more vulnerable to a flooding incident than those who live/work out of floodplain areas, but these areas can still be affected depending on the severity of the flooding incident. People caught up in a flooding situation face not only a risk of drowning, but also a risk of injury from stepping on sharp debris unseen below the floodwaters, electrocution, and infections from open wounds exposed to flood waters.
- **Environment Risk/Vulnerability.** Risks to the environment are high for a flooding incident, should one occur. Most of the environmental risks would be access to water and the effects floodwater has on public water supply. Flooding can affect and create contamination of potable water for public consumption resulting in the need for boil water notices and supplying other potable water sources (bottled water) to the public until the issue has been resolved.

Vulnerability

Flooding	
Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Community-wide
Potential Impact	Major

Land Use and Development Trends

Article III: Provisions for Flood Hazard Reduction of the City of Sugar Land Municipal Code regulates not only how land in designated floodplain areas may be used or altered, but the location and types of structures that are permitted in those areas as well as the specifications to which they must build. All structures, including residential and commercial properties, manufactured homes, and the developments of subdivisions are regulated.

Hazard Summary

The hazard for flooding in the City of Sugar Land remains low, due largely in part to previous mitigation measures. The City of Sugar Land HMPC recognized the dangers posed by flooding and has identified specific mitigation actions that have been taken and would be considered in the future.

4.2.7 Drought

Hazard Identification

The City of Sugar Land HMPC reviewed historical data from NCDC and the Natural Resources Conservation Service while researching drought conditions in Fort Bend County and the City of Sugar Land. By definition, a drought is a prolonged period of moisture deficiency. Drought conditions affect water availability and water quality.

The Palmer Drought Severity Index is a tool used in gauging long-term drought. For the purposes of this index, a zero is considered normal conditions, and drought is indicated by negative numbers -1 through -4. Excessive rainfall is depicted in positive numbers 1 through 4. The Palmer Drought Severity Index is provided in Table 4-13.

Table 4-12
Palmer Drought Severity Index¹⁰

Range	Description
-4.0 or less	Extreme drought
-3.0 to -3.9	Severe drought
-2.0 to -2.9	Moderate drought
-1.9 to +1.9	Near normal
+2.0 to +2.9	Unusual moist spell
+3.0 to +3.9	Very moist spell
+4.0 and above	Extremely moist

Hazard Profile

Fort Bend County and the City of Sugar Land experienced drought conditions in 2000. Agricultural losses are the most typical primary losses associated with drought. It is unlikely for critical facilities to sustain any damage or functional downtime due to dry weather conditions. Fort Bend County, including the City of Sugar Land, has experienced two drought incidents from 2000 to 2013. This correlates to a 15 percent chance of a drought occurring in the City every year.

The City of Sugar Land experienced terrible drought conditions in 2012 that resulted in major damage. The lack of rain and extreme heat broke pipelines and cracked sidewalks and foundations. The costs of repair totaled to nearly \$2 million for the City.

According to available data, the City of Sugar Land is experiencing nearly normal conditions, or -1.9 to +1.9, according to the Palmer Drought Severity Index. However, it is important to note that drought conditions continually fluctuate throughout the year.

¹⁰ Source: National Weather Service, <http://www.nws.noaa.gov/>

Section 4

In terms of extent, the City of Sugar Land has the potential to experience the entire range of effects, from extreme drought to extremely moist conditions, as described in the Palmer Drought Severity Index. The information presented in the following table presents information for Fort Bend County and Sugar Land as identified by SHELDUS and the NCDC. This information demonstrates the potential for drought in Sugar Land.

Table 4-13
Drought Incidents in and around Fort Bend County

Location or County	Date	Type	Magnitude	Death	Injuries	Property Damage	Crop Damage
Fort Bend (zone)	8/1/2000	Drought	N/A	0	0	Unknown	Unknown
Fort Bend (zone)	9/1/2000	Drought	N/A	0	0	Unknown	Unknown
Sugar Land	2012	Drought	N/A	0	0	\$2,000,000	Unknown

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** Drought conditions can result in shifting soils resulting in foundation issues for structures. A drought could also result in the loss of the availability of municipal water supply. This threat has been addressed by mitigation actions.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a drought incident. People are vulnerable to the effects of drought, including reduction to the available water supply (both public and private wells).
- **Environment Risk/Vulnerability.** Risks to the environment are high for a drought incident. Environmental concerns are of vegetation loss, trees in particular, and risk of erosion in areas that are affected by drought and reduced availability of water supply (both public and private wells).

Vulnerability

Drought	
Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Moderate–Major

Land Use and Development Trends

The City of Sugar Land is an urban area and does not have crops to be impacted by drought. Therefore, there is not land use trends related to drought. If needed, the City of Sugarland can pass special ordinances regulating the amount of water consumed and used during periods of drought to conserve water.

Hazard Summary

Droughts do not have the immediate effects of other natural hazards, but sustained drought can cause severe economic stress to the agricultural interests in the City of Sugar Land, Fort Bend

County, and the entire state. The potential negative effects of sustained drought are numerous. In addition to an increased threat of fires, drought can affect municipal and industrial water supplies, stream-water quality, water recreation facilities, hydropower generation, and agricultural resources. The HMPC discussed the limitations associated with mitigation actions for drought and identified mitigation actions related to the potential threat of drought in this plan.

4.2.8 Hurricanes/Tropical Storms

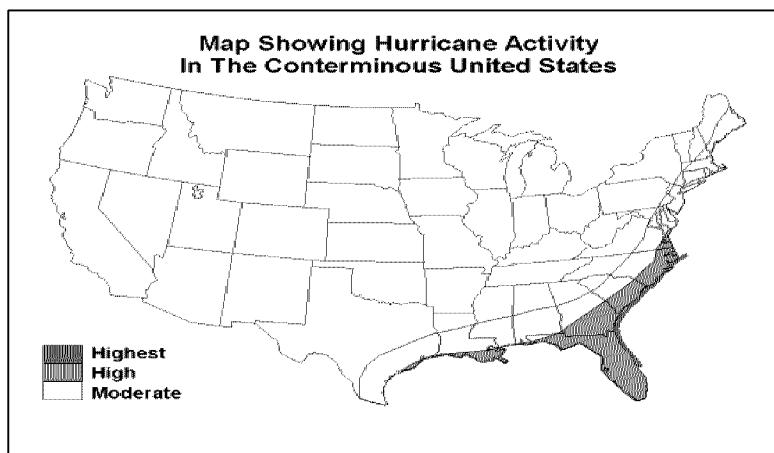
Hazard Identification

Tropical storms and hurricanes bring the threat of winds, heavy rains, and flooding that may require the need for Evacuee Support and Sheltering. Streets and highways become extremely hazardous to motorists due to debris, flooding, and power lines obstructing travel. A hurricane is a type of tropical cyclone and is the general term for all circulating weather systems (counterclockwise in the Northern Hemisphere) over tropical waters. Tropical storms are classified as follows:

- Tropical Depression – An organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph (33 knots) or less.
- Tropical Storm – An organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph (34-63 knots).
- Hurricane – An intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. In the western Pacific, hurricanes are called “typhoons,” and similar storms in the Indian Ocean are called “cyclones.”

Hurricanes are products of the Tropical Ocean and atmosphere. Powered by heat from the sea, they are steered by the easterly trade winds and the temperate westerly’s as well as by their own ferocious energy. Around their core, winds grow with great velocity, generating violent seas. When tropical storms/hurricanes move ashore, they sweep the ocean inward while spawning tornadoes and producing torrential rains and floods. Each year on average, 10 tropical storms (of which 6 become hurricanes) develop over the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Many of these remain over the ocean. However, about five hurricanes strike the United States coastline every three years. Of these five, two will be major hurricanes (Category 3 or greater on the Saffir-Simpson Hurricane Scale).

Figure 4-4
Hurricane Activity in the Conterminous United States



Section 4

Source: U.S. Geological Survey Geographic Distribution

All tropical storms/hurricanes are dangerous, but some are more dangerous than others. The way storm surge, wind, and other factors combine determine the hurricane's destructive power. National Oceanic and Atmospheric Administration (NOAA) assesses tropical storm wind speeds according to the Saffir-Simpson Hurricane Scale, shown in Table 4-15 below.

Table 4-14
Saffir-Simpson Hurricane Scale

Category	Winds	Effects
1	74-95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage.
2	96-110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of center. Small craft in unprotected anchorages break moorings.
3	111-130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtain wall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain continuously lower than 5 feet ASL may be flooded inland 8 miles or more.
4	131-155 mph	More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach. Major damage to lower floors of structures near the shore. Terrains continuously lower than 10 feet ASL may be flooded requiring massive evacuation of residential areas inland as far as 6 miles.
5	Greater than 155 mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Major damage to lower floors of all structures located less than 15 feet ASL and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5 to 10 miles of the shoreline may be required.

Hazard Profile

There is a threat of tropical storms/hurricanes occurring in the City of Sugar Land. Fort Bend County experienced two hurricanes and two tropical storms since 2000. A review of historical weather data indicates there is a significant chance of tropical storms/hurricanes affecting the City of Sugar Land each year. Tropical storms/hurricanes normally allow time for preplanning for this type of incident.

The information presented in the following table presents information for Fort Bend County as identified by SHELDUS and the NCDC. This information demonstrates the potential for hurricanes or tropical storms in Sugar Land.

Table 4-15
Hurricanes and Tropical Storms

Location	Date	Type	Magnitude	Death	Injuries	Property Damage
Fort Bend (zone)	9/10/2008	Hurricane	Category 2	0	0	\$400 million

Location	Date	Type	Magnitude	Death	Injuries	Property Damage
Fort Bend (zone)	9/5/2002	Tropical Storm	N/A	0	3	\$4.5 million
Fort Bend (zone)	6/7/2001	Tropical Storm	N/A	0	0	\$7.7 million
Fort Bend (zone)	8/18/1983	Hurricane	Category 3	0	0	\$14.4 million

Hurricane Ike

The last hurricane to affect the City of Sugar Land was Hurricane Ike in 2008. Hurricane Ike came ashore in Galveston, Texas as a strong category 2 hurricane but with a storm surge resembling a category 4 hurricane. The storm surge did significant damage to the upper Texas and Louisiana coast.

In Sugar Land, while there was no loss of life, 200 miles of roadway had to be cleared, 700 city signs had to be reinstalled, 469 permits were issued for roof repairs, 78 city traffic signal lights had to be repaired, and 600 storm drains had to be cleared of debris. Several city buildings sustained roof damage and an extensive disaster debris cleanup operation was undertaken in involving 40 trucks and support vehicles. In total, the expenses to the city from Hurricane Ike totaled approximately six million dollars the bulk of which went to debris clean up. Damages would have been more severe had Ike made landfall in western Galveston County or in Brazoria County.

Probability of Hurricanes and Tropical Storms Affecting the City of Sugar Land

Data from the National Weather Service Historic Hurricane Tracker indicates that Fort Bend County has experienced 18 hurricanes and 26 tropical experiences tropical storms since 1900. That would indicate that Fort Bend County averages a tropical storm approximately every 4 years. In addition, based on data from the 1999 study, *Hurricanes of the North Atlantic, Climate and Study*, Fort Bend County is has an approximate 6.5 year return period between hurricanes (based on neighboring Brazoria and Harris Counties), which equates to an approximate 15% annual probability of future occurrences. Major hurricanes have occurred every 14 years in Brazoria County and 32.3 years in Harris County. Using the average of the two Counties (23.1 years), this translates to an approximate 4% annual probability as shown in the chart below.¹¹

Table 4-16
Annual Probability of Tropical Storms and Hurricanes Impacting the City of Sugar Land, 1900 – 2014

Magnitude	# of Events	Annual Probability	Wind Impacts
Tropical Storms	26	23%	Moderate
Hurricanes (Categories 1 and 2)	11	15%	High
Major Hurricanes (Categories 3,4, and 5)	7	4%	High to Extreme

¹¹ *Hurricanes of the North Atlantic, Climate and Society*, James Elsner and A. Birol Kara, New York, Oxford University Press, 1999

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** High winds caused from hurricanes/tropical storms have the potential to cause roof damage, window damage, down trees and power lines, and cause building collapse. The potential for flooding poses a significant threat to property, causing potentially severe damage and possibly contaminating the water supply. Therefore, the risk to property in general is high for a hurricane/tropical storm.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a hurricane/tropical storm. People are vulnerable to the effects of hurricane/tropical storms, including the need to evacuate and dangers caused by high winds and flooding. There may be extended power outages affecting individuals who rely on health support systems, (i.e. ventilators) that rely on power. There is also the increased risk of injury or death during a storm, as well as an increased risk of injury and death during clean up after a storm. Responders are also at increased risk of injury responding to calls for assistance during or immediately after a storm.
- **Environment Risk/Vulnerability.** Risks to the environment are high for a hurricane/tropical storm. Environmental concerns are loss of vegetation and risk of erosion in areas that are affected by the storm and contamination of water supply (both public and private wells). Hazard materials spills as a result of high winds and storm surge may also impact the environment necessitating containment and clean up operations.

Vulnerability

Hurricanes/Tropical Storms

Frequency of Occurrence	Likely
Warning Time	More than 12 hours
Geographic Extent	Countywide
Potential Impact	Major

Land Use and Development Trends

The municipal codes in effect for flooding also apply to hurricanes/tropical storms as a result of the potential for flooding. Additionally, all structures in the City of Sugar Land are required to meet specific codes for high wind damage. New development must consider the impact of flooding in the areas where properties are being built.

Hazard Summary

Overall, tropical storms and hurricanes pose one of the greatest threats to the City of Sugar Land in terms of property damage, as well as injuries and loss of life. Based on the frequency of this hazard, as well as its ability to negatively impact anywhere in the City of Sugar Land, the pre-disaster mitigation measures identified in this plan should be aggressively pursued.

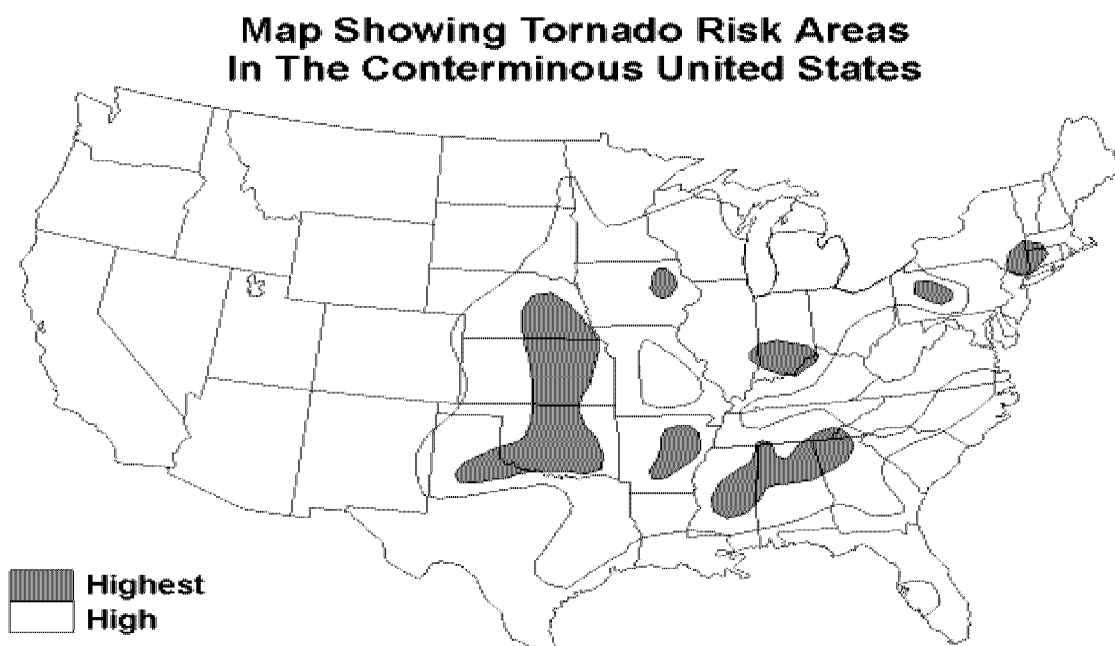
4.2.9 Tornadoes

Hazard Identification

The City of Sugar Land HMPC reviewed historical data from both SHELDS and the NCDC in researching the past incidents and effects of tornadoes in the City of Sugar Land. A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one-mile wide and 50 miles long. Tornado season in Texas runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.¹²

In terms of extent, the City may experience tornadoes ranging from EF0 (65-85 mph) to EF4 (166-200 mph). The levels of tornado risk nationwide are depicted in Figure 4-5. The NOAA National Weather Service utilizes the recently updated Enhanced Fujita (EF) Scale to rate the severity of tornadoes. Table 4-16 describes the EF Scale and associated wind speed categories.

Figure 4-5
Tornado Risk Areas in the Conterminous United States



¹² Source: National Weather Service, <http://www.nws.noaa.gov>

Table 4-16
Enhanced Fujita Scale¹³

Fujita Scale			Derived EF Scale		Operational EF Scale	
F Number	Fastest ¼ Mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

Hazard Profile

All of the City of Sugar Land is vulnerable to the threat of a tornado because one cannot predict exactly when or where a tornado might strike. The City of Sugar Land has experienced 6 tornadoes within the last 16 years. In addition, countless tornado watches have been recorded during this period. Trend analysis indicates that a tornado will touch down in the City of Sugar Land approximately every three years. This equates to a 30 percent chance of a tornado touching down in the City of Sugar Land in any given year. Tornadoes tend to strike in somewhat random fashion, making the task of reliably calculating a recurrence interval extremely difficult. The damage potential associated with a tornado is extremely high.

A tornado rated on the Fujita Scale as an EF3 touched down at the First Colony Mall in the City of Sugar Land in 1998. The tornado was 200 yards wide and on the ground for a distance of 1.2 miles. The Dillard's department store received major damage and many other stores in the mall were damaged as well. The tornado crossed U.S. Highway 59 and damaged an ice skating rink as well as other nearby stores and signs. The tornado ended its path on the south side of U.S. Highway 6 and Williams Grant Road. Four people were injured from flying glass during the incident and the estimated damage totaled \$3.7 million.

On November 17, 2003, a series of severe thunderstorms caused a total of 24 tornadoes to touch down throughout southeast Texas in a 15-hour period. An EF2 tornado touched down in the City of Sugar Land during this incident. The tornado, which touched down on West Airport Drive near Industrial Drive, was 200 feet wide and traveled a distance of 1.5 miles. The storm caused 60 minor injuries, with seven people sent to hospital for further treatment. The tornado damaged several office building roofs in Industrial Park, residential homes in The Meadows subdivision,

¹³ The Enhanced Fujita Scale still is a set of wind estimates (not measurements) based on damage. It uses 3-second gusts estimated at the point of damage based on a judgment of levels of damage to various indicators. These estimates vary with height and exposure. The 3-second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured "1-minute mile" speed.

and a daycare facility at West Airport Drive and Dairy Ashford Road. There were also several reports of cars overturned or blown off the road along Airport Drive.

These incidents as well as other confirmed tornadoes are listed below.

Table 4-17
Confirmed Tornadoes

Location	Date	Type	Magnitude	Death	Injuries	Property Damage
Sugar Land	10/23/1997	Tornado	EF1	0	0	\$1.1 million
Sugar Land	2/16/1998	Tornado	EF3	0	4	\$3.7 million
Sugar Land	6/3/2003	Tornado	EF0	0	0	\$14,000
Sugar Land	10/9/2003	Tornado	EF0	0	0	\$25,000
Sugar Land	11/17/2003	Tornado	EF2	0	60	\$500,000
Sugar Land	11/23/2004	Tornado	EF0	0	0	0

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It can be assumed that all structures and facilities within the City of Sugar Land could be damaged by a tornado because tornadoes are among the most unpredictable of weather phenomena and are indiscriminate as to when or where they strike. Severe damage could occur to roofs, windows and walls of city structures, residences and businesses. In addition, a tornado might result in damage to critical infrastructure such as power generation and transmission systems, communications systems, water and wastewater facilities.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a tornado and no way to predict when or where a tornado will occur. People are vulnerable to the effects of tornadoes, including injuries, deaths, power outages, disruption to transportation routes, damage to shelter, flying debris, etc.
- **Environment Risk/Vulnerability.** Risks to the environment can be significant. Environmental risks can include flying debris and destruction of critical infrastructure that damage and affect water supply and contamination of potable water for public consumption. A tornado may also result in hazardous materials spills resulting in containment and clean up response activities.

Vulnerability

Tornadoes

Frequency of Occurrence	Likely
Warning Time	None–Minimal
Geographic Extent	Community-wide
Potential Impact	Major

Land Use and Development Trends

Continued development in the City of Sugar Land will result in an increase in the potential for damage from tornadoes. The City enforces the Texas State Building Code, which requires structures to be designed and constructed for wind loads. The use and enforcement of these codes provides reasonable protection from most natural hazards, including tornadoes. Updating building codes and the adoption of these codes will reduce vulnerability and damage from tornadoes.

Hazard Summary

Overall, the City of Sugar Land has high exposure to potential damage from tornadoes. Should a tornado hit certain portions of the City of Sugar Land that are highly concentrated with homes or any of the critical facilities identified, depending upon the strength and duration of the incident, significant damage could occur. Due to the destructive nature of tornadoes, it is imperative that the pre-disaster mitigation measures identified in this plan receive full consideration. Specific mitigation actions related to tornadoes are identified in this plan.

4.3 Technological Hazards

Technological hazards are distinct from natural hazards primarily in that they originate from human activity. In contrast, while the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-caused. The term “technological hazards” refers to the origins of incidents that can arise from human activities, such as the manufacturing, transportation, storage, and use of hazardous materials.

4.3.1 Dam and Levee Failure

Hazard Identification

Dam hazard rankings are based on the National Inventory of Dams (NID) classification. The NID ranks dams according to the potential loss of life as well as the potential impacts on economic, environmental, and important community lifelines. Table 4-19 describes the classification of dams according to the NID.

Table 4-18
National Inventory of Dams Classifications

National Inventory of Dams Classifications

High hazard classification - loss of one human life is likely if the dam fails

Significant hazard classification - possible loss of human life and likely significant property or environmental destruction

Equal to or exceeds 25 feet in height and exceeds 15 acre-feet in storage

Equal to or exceeds 50 acre-feet in storage and exceeds 6 feet in height

A levee is a natural or artificial slope or wall, either earthen or concrete, and often parallels the course of a river. The main purpose of a manmade levee is to prevent flooding to adjacent

development or farmland. Engineered levees are typically reinforced with concrete and rip-rap to prevent erosion or failure. Rip-rap is material that is placed on the banks of water courses (typically streams and rivers, but also including lakes and ponds) to prevent or reduce erosion.

Levee failure can occur in numerous ways but the most common is a breach, which occurs when part of the levee actually breaks away, leaving a large opening for water to flood the land protected by the structure. A breach can be a sudden or gradual failure that is caused either by surface erosion or by a subsurface failure of the levee. Failure can also occur when water overtops the crest of a levee. This is known as overtopping, where floodwater exceeds the lowest crest of a levee, flooding the surrounding area.

Hazard Profile

There are three dams located within the city limits of Sugar Land. Only one of the dams, known as Dam 3, located along Oyster Creek, approximately 2.4 miles downstream of US Highway 59 and just North of Lexington Boulevard, has been classified by the TCEQ as a high hazard dam. Per TCEQ rules, Dam 3 is required to pass 75% of the Probable Maximum Flood (PMF). PMF is defined as the greatest flood to be expected assuming complete coincidence of all factors that would produce the heaviest rainfall and maximum runoff. Based on the initial assessment, Dam 3 was found to be hydraulically inadequate to pass the 75% PMF as required. Currently, a detailed Study/Modeling effort is underway to confirm the findings from this initial assessment and to identify any potential design retrofits that may be necessary (for Dam 3) to address hydraulic deficiencies.

According to available records, the City of Sugar Land has not yet experienced a dam failure. The effects on life and property in the area could be significant if a dam were to fail because of the nature of the built environment. According to a recent study, a dam failure at Dam 3 would result in six of nine bridges located downstream from the dam along Oyster Creek would be overtopped. Five of the six bridges are footbridges and does not pose any serious hazard; however, the bridge at Lexington Blvd is below the top of dam elevation and would be overtopped. As a result, water would spill down away from Oyster Creek resulting in the potential for three homes and a church on the east side of Oyster Creek to be inundated. The depth of inundation in the homes and church would be from .1 feet to 1.1 feet based on the elevation of each property.

No levee failures have occurred in the City of Sugar Land. The City of Sugar Land contains five Levee Improvement Districts (LID), the largest of which is Fort Bend County (FBC) LID #2. This LID protects over \$4 billion of property and assets in the City of Sugar Land, including major portions of First Colony, the Sugar Land Town Square, multiple hospitals, major retail centers and businesses, and critical transportation routes. As of March 2009, FBC LID #2 met 500-year flood protection standards. The other LIDs in the City of Sugar Land include FBC LID #17, FBC LID #10, FBC LID #14, First Colony LID #2 and First Colony LID #1. Figure 4-6 shows a map of these LIDs.

Figure 4-6
Location of Dams in the City of Sugar Land

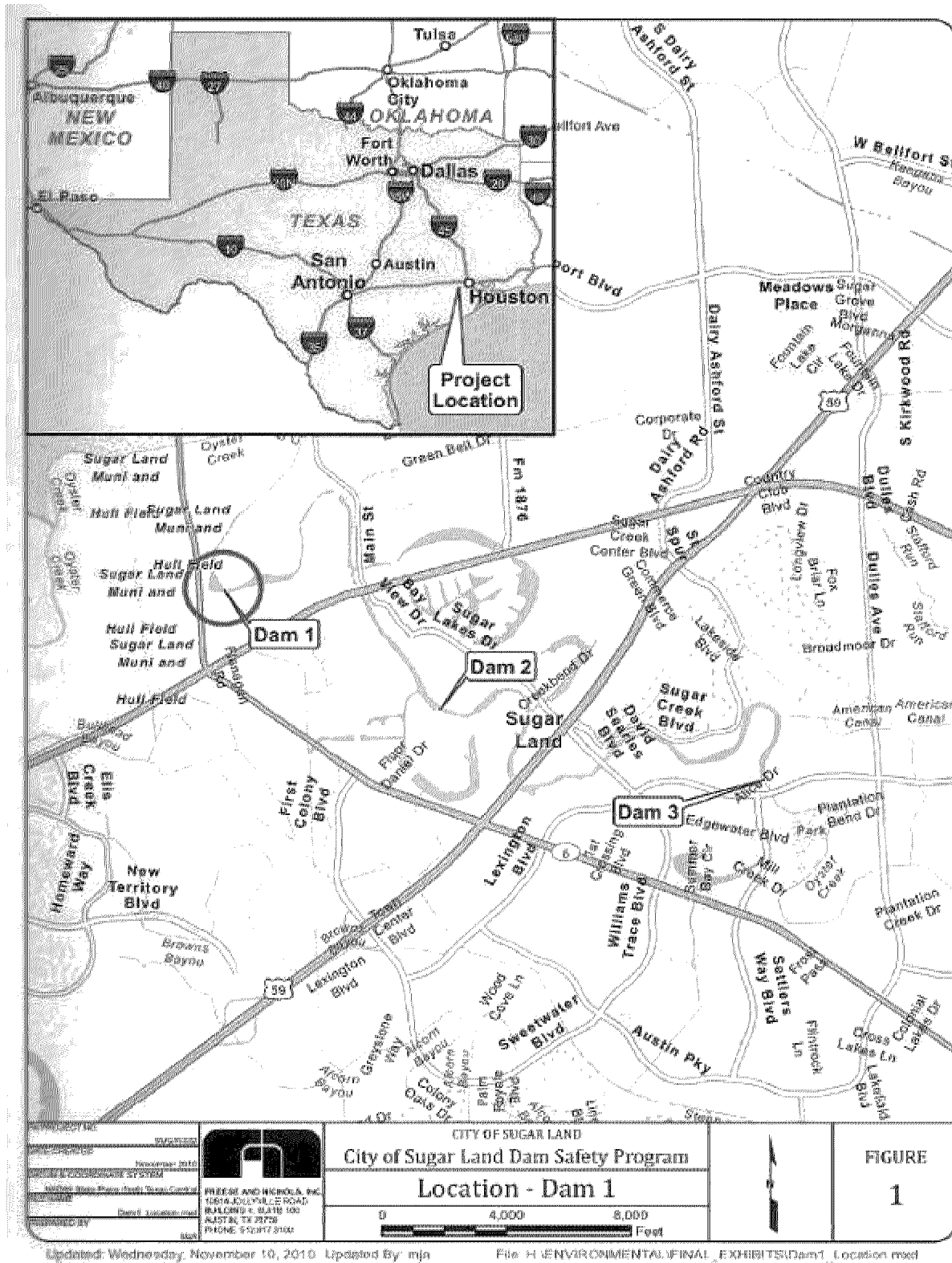
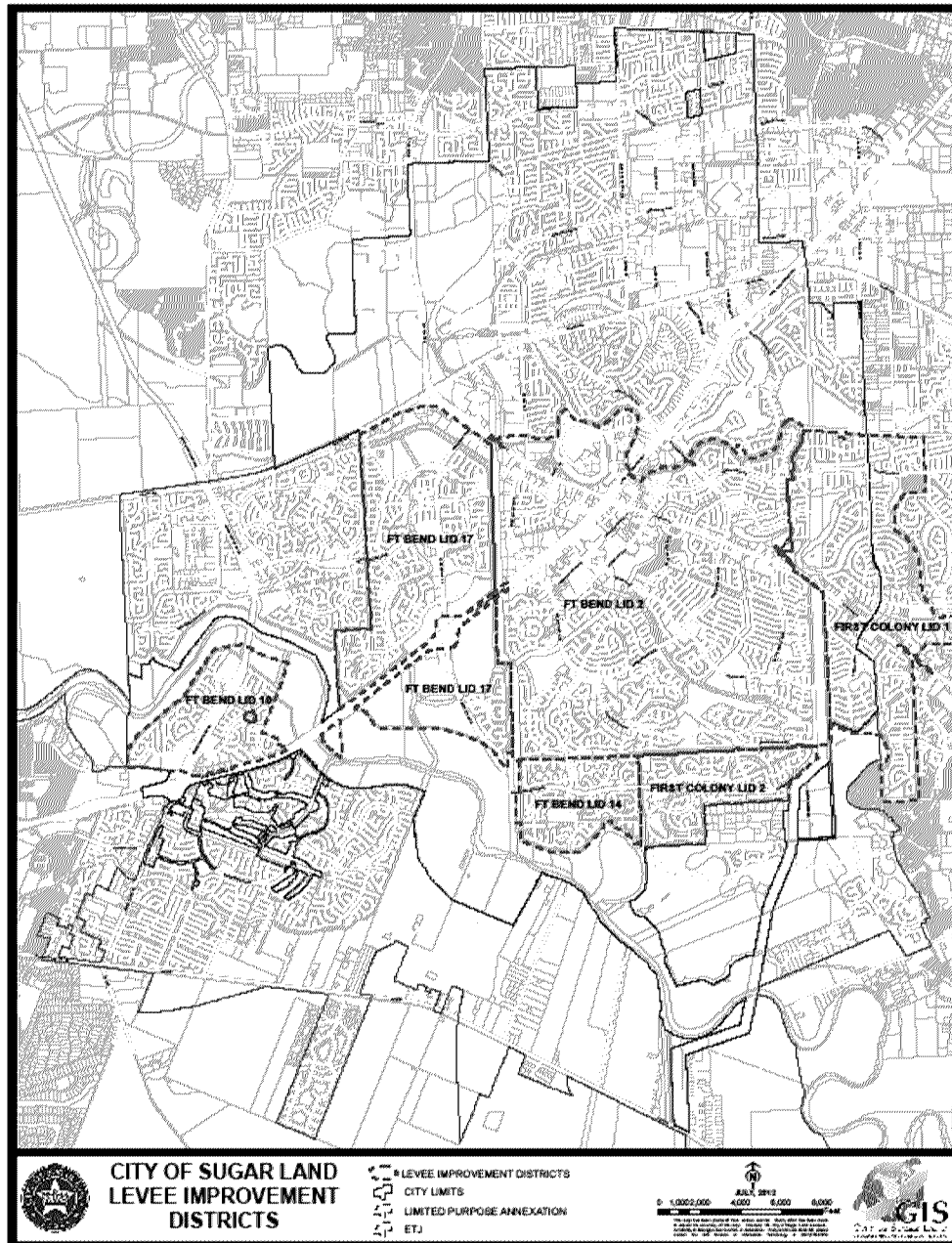


Figure 4-7
City of Sugar Land Levee Improvement Districts



Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that critical facilities as well as public, private, and commercial properties are vulnerable to being affected by a dam and levee failure if they are located in the inundation area.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the majority of the population in the City of Sugar Land given that the levee system runs throughout the City. People are vulnerable to the effects of dam and levee failure through power outages, effects on transportation routes, establishment of shelters, flooding, etc. The risk of

drowning and flood related injuries (increased risk of infection, stepping on sharp debris under water, etc) may also increase.

- **Environment Risk/Vulnerability.** Risks to the environment are high should a dam or levee failure occur, but the frequency of levee failures in the City of Sugar Land is low. Environmental concerns are interruption of water supply, water contamination, and loss of properties.

Vulnerability

Dam and Levee Failure

Frequency of Occurrence	Unlikely
Warning Time	3–6 Hours
Geographic Extent	Community-wide
Potential Impact	Major

Land Use and Development Trends

When a dam is built, the surrounding area is vulnerable to a dam failure. The safety and permitting of dams is monitored by the Texas Department of Natural Resources. Whenever a dam is to be built, it must be approved by the State Dam Safety Engineer and comply with the Permit Guidelines for Dams. If a dam is considered high hazard, its owners are required by the State of Texas to develop an emergency action plan in response to possible failure.

Hazard Summary

Based on available records, the City has not experienced any instances of dam or levee failure. Susceptible areas surrounding the Smithers Lake Dam or LIDs located within the City will continue to be monitored by the HMPC for the identification of need for new mitigation actions.

4.3.2 Terrorism

Hazard Identification

Terrorism is defined in the Code of Federal Regulations as "The unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

The primary objectives of most terrorist groups are to:

- Gain publicity
- Stimulate loss of confidence in the government
- Attract recruits
- Get public support
- Gain support from financial institutions, and ultimately
- Weaken and overthrow the government

Techniques used to gain an audience for their platform include hostage-taking, product-tampering, criminal extortion, arson, sabotage, threats against individual family members,

assassinations, kidnapping, explosive bombings, and armed attacks. The most likely targets of these forms of terrorism are political leaders, key military personnel, foreign missions, military facilities, corporate executives and facilities, and celebrities. Unfortunately, the risk of terrorist acts exists in the Texas and cannot be ruled out for the City of Sugar Land. Terrorist attacks can take a wide variety of forms, ranging from a verbal threat to sabotage to biological weapons to a bomb. The most frequently used terrorist methods include but are not limited to the following:

- **Bombs, Guns, and Explosives:** These are the “traditional” weapons used by terrorists worldwide. Typically, these weapons are less technically and resource demanding.
- **Biological Weapons:** These weapons use infectious microbes or toxins to produce illness or death in people, animals, or plants. Potential biological weapons include anthrax, botulism, smallpox, viral hemorrhagic fevers, water safety threats (for example, cholera), and food safety threats (for example, salmonella). Biological weapons are relatively difficult to cultivate and disseminate.
- **Chemical Weapons:** Chemical weapons cause severe health reactions designed to incapacitate or cause death. There is a wide array of potential chemical agents that could be used as weapons. These agents vary in how their effects on the body, required dose, exposure mechanism, length of exposure, toxicity, origination, and form (for example, liquid, gas). Examples of chemical agents include sarin, mustard agent, VX, and cyanide. Stockpiles of many of these agents are held at the Umatilla Chemical Depot, pending destruction.
- **Radiological and Nuclear Weapons:** Although there has been much speculation by media and various governmental agencies regarding the potential for a terrorist to obtain fissionable material or a nuclear bomb, there are no known unclassified cases of any such organization or group actually obtaining weapons grade material. Constructing a nuclear bomb would be relatively difficult and require special resources, training, and materials.

Hazard Profile

A major terrorism hazard incident has been determined to have a low likelihood of occurrence in the City of Sugar Land within the five-year planning cycle of this plan. Therefore, although some hazard characterization information is presented below, no further risk assessment has been performed for this hazard. Additional analyses to further characterize the risks of this hazard and the development of suitable mitigation action items will be conducted in the future based on periodic reviews of this hazard mitigation plan and available resources.

Terrorist incidents in this country prior to the September 11, 2001 attacks included bombings of the World Trade Center in New York City, the United States Capitol Building in Washington, D.C., Mobil Oil corporate headquarters in New York City, the Murrah Federal Building in Oklahoma City, and the recent Boston Marathon terrorist attacks. In the United States, most terrorist incidents have involved small extremist groups using terrorism to further a designated objective or obtain publicity for a cause. Bombings have been the most frequent method of attack in the United States. Other possibilities include attacks against transportation facilities, utilities, or other public services or an incident involving chemical or biological materials.

Active shooter incidents are becoming known more and more as terrorist events. The shooting of random civilians in the United States occurs in schools, office buildings, government functions, and even public venues. The most notable active shooter events include the 1999 Columbine High School shootings, Virginia Tech shootings, the shooting in Arizona at a U.S. House of

Representative Gabrielle Giffords event, and the movie theatre shootings in Aurora, Colorado. These events are random and the shooters are hard to profile. Therefore, everyone must be vigilant at all times.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** All assets within the City of Sugar Land are vulnerable to being affected by a terrorist incident; however, there are several pieces of infrastructure that pose a larger threat than others do. Due to the high volume of people, a venue such as Constellation Field, home of the regional baseball team Sugar Land Skeeters, poses a high risk for terrorism. Additionally, the NALCO Company is a prime target for terrorism due to the nature of the chemicals made there. The NALCO Company and the City of Sugar Land work together to ensure security measures are tight and all planning is comprehensive. Sugar Land government facilities and schools are vulnerable to active shooter incidents.
- **People Risk/Vulnerability.** In evaluating vulnerability of the population in the City, it was determined that risk/vulnerability includes the entire population of the City of Sugar Land, because there is no way to determine the impact/magnitude of a terrorist incident and no way to predict where and when a terrorist incident will occur. People are vulnerable to terrorist incidents through physical injury or disease, power outages, effects on transportation routes, establishment of shelters, effect of incident on mental state of the public, confidence of public in law enforcement support, contamination of the food supply, etc.
- **Environment Risk/Vulnerability.** Risks to the environment are high should a terrorist incident occur but the frequency of terrorist incidents in the City of Sugar Land is low. Environmental concerns are interruption or contamination of water or food supplies, secondary incidents such as fires and hazmat accidents (such as gas pipelines rupturing, rupture of hazmat containers at facilities, etc.).

Vulnerability

Terrorism	
Frequency of Occurrence	Unlikely
Warning Time	None–Minimal
Geographic Extent	Community-wide
Potential Impact	Negligible–Major

Land Use and Development Trends

Future development throughout the City of Sugar Land will take into consideration possible terrorist incidents; particularly if new facilities are built that could be potential terrorist targets, such as a festival site and a community center currently under construction. Local law enforcement is planning for potential security risks to the facility as a result of the new development.

Hazard Summary

Terrorism incidents have occurred in the United States but not in the City of Sugar Land.

4.3.3 Hazardous Materials Spills

Hazard Identification

A major source of hazardous spills is along roadways, highways, and railways. Hazardous materials are substances that are harmful to the health and safety of people and property. Facilities that produce, process, or store hazardous materials are at risk, as are facilities that treat or dispose of hazardous waste.

Hazard Profile

Hazardous materials spills occur frequently within the City of Sugar Land. Transportation-related spills are typically the most prevalent. This is directly attributable to the presence of an interstate highways (I-69) and several multilane highways (Hwy 6, 90, 99, etc.) running through portions of the City of Sugar Land. Another concern that the City of Sugar Land has regarding hazardous materials transportation is the train line that is located next to the Sugar Land Regional Airport. The airport primarily serves corporate travelers but also serves as the main reliever for larger airports in the Houston area. A railway that carries hazardous materials is located next to the airport. City emergency management officials have long been concerned about a plane accident that might impact the railway or cause a hazardous materials incident and have even exercised the scenario. Fortunately, an incident has never occurred.

A hazardous materials incident did occur on January 8, 2007. NALCO employees were offloading Ethylenediamine from a Department of Transportation 407 tank trailer when an overpressure of the tank occurred, causing the frangible disk to fail and releasing a large vapor cloud of the product into the air. Traffic on Highway 90A was redirected in all lanes as were several smaller roads in the area. A shelter-in-place order was issued for a one-mile radius of the accident, including all businesses and residential, and education facilities. NALCO personnel responded and directed incident response operations, and a shelter was opened to receive those ordered to evacuate with no place to go.

Another incident occurred in May 2010. A VWR Scientific employee spilt a small amount of hydrochloric acid and ethyl ether. City of Sugar Land Fire Department personnel responded to the incident, ensuring that VWR Scientific office employees sheltered-in-place and that the warehouse was evacuated. Fortunately, the spill was contained in the warehouse and the incident did not impact roadways. Since the incident, new safety measures have been put in place by management and future incidents like this are unlikely. A list of all recent hazmat incidents in the City are listed below.

Table 4-19
Hazmat Incident Responses

Hazard Date	Location	Hazard Description	Death	Injuries	Property Damage
01-08-07	7701 US 90A SL, TX	Plume release of Ethylenediamine, city wide, shelter-in-place	0	4	Unknown
05-19-10	12835 Jess Pirtle SL, TX	Spill & mix of Hydrochloric Acid & Ethyl ether; building of origin, shelter-in-place for office	0	0	Unknown
06-25-10	HWY 59 S @Grand Parkway	Overturn diesel tanker onto the freeway and sewer system	1	4	Unknown
10-27-11	HWY 59 S @Dairy Ashford feeder. SL, TX	Tanker fire & release of gasoline and diesel onto ground and sewer system; no shelter-in-place	0	0	Unknown

HWY = Highway

SL = Sugar Land

TX = Texas

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** With multiple highway systems, all critical facilities have the possibility of being affected by a hazmat incident. Certain corrosive materials can damage roadways and other surfaces they contact.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City because there is no way to determine the impact/magnitude of a hazmat incident and no way to predict where and when a hazmat incident will occur. People are vulnerable to hazmat incidents through possible injuries, deaths, effects on transportation routes, establishment of shelters, etc. Responders to hazardous materials incidents are vulnerable to injury from exposure.
- **Environment Risk/Vulnerability.** Risks to the environment are high should a hazmat accident occur. Environmental concerns are interruption of water supply and secondary incidents such as fires and hazmat accidents (such as gas pipelines rupturing, rupture of hazmat containers at facilities, etc.). When spills do occur, whether inside or outside facilities or along roadways, shutdowns, lost time, and expended man-hours are all factors mitigation planners must take into account.

Vulnerability

Hazmat Spills

Frequency of Occurrence	Likely
Warning Time	None–Minimal
Geographic Extent	Localized–Community-wide
Potential Impact	Moderate

Land Use and Development Trends

The City of Sugar Land determines the land use and development trends of commercial districts and properties. The chemicals used in production of different resources is monitored and those companies are required to report chemicals used in their facilities to the State of Texas.

Hazard Summary

The types of hazardous materials at both fixed facilities and passing through on major transportation thoroughfares in the City of Sugar Land are many and varied. The presence of interstate highways and multilane highways with an unknown quantity of hazardous materials traveling through the City of Sugar Land on a daily basis poses a challenge in the development of adequate mitigation measures.

4.3.4 Energy/Fuel Shortage

Hazard Identification

Tropical storm incidents in the past 20 years have identified the possibility of energy/fuel shortage for the City of Sugar Land. This is due to limited supplies coming into the area following an incident and therefore causing fuel rations or the prioritization of fuel supply for both emergency services and residents of the City of Sugar Land. An energy/fuel shortage could also be due to damage to natural gas pipelines post-storm and to the need to shut down the pipelines for repairs.

Hazard Profile

There have been no energy/fuel shortages in the past in the City of Sugar Land. However, in the last five years, incidents have shown the potential is there for an interruption/shortage of fuel supply.

The probability of energy/fuel shortage is minimal. The low probability of an incident suggests that the potential for impacts is minimal. Based on records from the past 10 years, the probability of future energy/fuel shortage occurring in the City of Sugar Land and the planning area is considered low.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** All critical facilities are considered as having the possibility of being affected by an energy or fuel shortage. Critical operations could be disrupted if power to these facilities is interrupted and they are not backup up by generators.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City of Sugar Land because there is no way to determine the impact/magnitude of a power outage incident or fuel shortage and no way to predict where and when an incident will occur. Effects of power outages include the loss of heat, loss of air conditioning, loss of ability to refrigerate food, accidents that occur due to reduced visibility in the dark, loss of ability to use medical devices that require electricity (such as respirators, etc.).
- **Environment Risk/Vulnerability.** Risks to the environment are low should a power outage occur.

Vulnerability

Energy or Fuel Shortage

Frequency of Occurrence	Unlikely
Warning Time	None–Minimal
Geographic Extent	Local–Countywide
Potential Impact	Minor

Land Use and Development Trends

The City of Sugar Land requires certain facilities are required to store backup generators and fuel. There are requirements for the placement of transmission lines, transformers, and power lines to safeguard the community from long-term power outages.

Hazard Summary

Energy/fuel shortages are an uncommon occurrence in the City of Sugar Land. However, the potential for an energy/fuel shortage in the City of Sugar Land poses an interesting challenge in the development of adequate mitigation measures. The City of Sugar Land HMPC has identified specific mitigation actions in this plan.

4.3.5 Aircraft Accidents/Transportation Accidents

Hazard Identification

The City of Sugar Land is located approximately 22 miles east of Houston, Texas. The area has two major airports: William P. Hobby Airport and George Bush Intercontinental Airport. The City of Sugar Land is located in the flight pathway of both airports, making it vulnerable to the effects of aircraft accidents. The City of Sugar Land is also home to the Sugar Land Regional Airport.

Hazard Profile

There have been no aircraft accidents in the past in the City of Sugar Land. However, the potential exists due to the high volume of air traffic that goes in and out of the area's airports.

The probability of an aircraft accident is minimal. The low probability of an incident suggests that the potential for impact is minimal. Based on historical records from the past 13 years, the probability of an aircraft accident occurring in the City of Sugar Land and the planning area is considered low.

Assets Exposed to Hazard

- **Property Risk/Vulnerability.** It was determined that all critical facilities have the possibility of being affected by an aircraft accident.
- **People Risk/Vulnerability.** It was determined that risk/vulnerability includes the entire population of the City because there is no way to determine the impact/magnitude of an aircraft accident incident and no way to predict where and when an aircraft accident incident will occur. People are vulnerable to aircraft accident incidents due to the location of the county near many airports. Risks include injuries or death to those in an aircraft, those on the ground, and to responders to an aircraft accident.

- **Environment Risk/Vulnerability.** Risks to the environment are low should an aircraft accident occur. Environmental concerns are the impact of the aircraft on or near a natural gas line and secondary incidents such as fires and hazmat accidents (rupture of gas pipelines, rupture of hazmat containers at facilities, etc.).

Vulnerability

Aircraft Accidents

Frequency of Occurrence	Unlikely
Warning Time	None
Geographic Extent	Localized
Potential Impact	Minor–Moderate

Land Use and Development Trends

The City of Sugar Land regulates development for the City of Sugar Land Regional Airport.

Hazard Summary

Aircraft accidents are an uncommon occurrence in the City of Sugar Land. However, the potential for an aircraft accident in the City of Sugar Land poses a challenge in the development of adequate mitigation measures. The City of Sugar Land HMPC has identified specific mitigation actions in this plan.

Section 5

MITIGATION STRATEGIES

44 CFR Requirement

§201.6(c)(3)	The plan shall include the following: A <i>mitigation strategy</i> that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.
§201.6(c)(3)(i)	The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
§201.6(c)(3)(ii)	The hazard mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
§201.6(c)(3)(iii)	The hazard mitigation strategy shall include an action plan, describing how the action identified in paragraph (c) (3) (ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
§201.6(c)(4)(ii)	The plan shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate.

The foundation of the City of Sugar Land Hazard Mitigation Plan (HMP) is the identification of strategies through which City of Sugar Land will implement hazard mitigation goals, objectives, and actions. For each identified hazard, goals and objectives are provided as part of the mitigation strategy. Mitigation actions for all the cities and townships within City of Sugar Land are incorporated into City of Sugar Land's goals, objectives, and actions. Individual jurisdictions adopt specific goals and strategies based on the needs of the jurisdiction.

Each of the project cost estimations were based on agency expertise by those submitting mitigation actions as well as previous project costs. Estimated costs were those calculated to apply for grant funding. However, many projects provided have not yet undergone the official benefit costs analysis provided by FEMA. In these cases, jurisdictions derived the benefit cost

per project based on a study conducted by the Multi-hazard Mitigation Council (MMC)¹⁴. The key findings of the report included that a dollar spent on mitigation saves society an average of \$4.00, with positive benefit-cost ratios for all hazard types studied. Therefore, to reflect the benefits of each future project each estimated project was multiplied by 4 to represent the benefit of each mitigation strategy. Utilizing this information in addition to their jurisdictions' priorities, they ranked their mitigation strategies and submitted them to the Committee.

Following this process, the suggested strategies were compiled into categories dependent on the particular hazard they related to. If a mitigation strategy applied to multiple hazards or would increase the overall preparedness of the emergency response system, the mitigation strategy was labeled as addressing "all-hazards". The City of Sugar Land Hazard Mitigation Planning Committee (HMPC) determined that the strategies should be ranked according to the hazards that present the largest threat to the City. As such, the mitigation strategies were ranked in accordance with the hazard rankings in the executive summary of this plan with the exception of the all hazards mitigation strategies. Since the all hazards mitigation strategies refer to those action items which will prepare the City for all emergencies or disasters, the HMPC determined they should be ranked first, with the hazard specific mitigation strategies following. Therefore, the mitigation goals are ranked as follows:

- **Goal 1:** Provide power sources for critical facilities throughout Sugar Land.
- **Goal 2:** Ensure the City of Sugar Land has all necessary response equipment in place.
- **Goal 3:** Harden City of Sugar Land critical facilities against high winds and hail.
- **Goal 4:** Utilize Federal flood prevention programs to ensure reduced vulnerability to flooding.
- **Goal 5:** Ensure proper drainage of storm water throughout Sugar Land.
- **Goal 6:** Participate in the intelligence cycle as it relates to terrorist events and how they are conducted throughout the U.S. and overseas.
- **Goal 7:** Identify and address potential threats for specific location and special event occurrences.
- **Goal 8:** Provide a more secure environment for Fort Bend County Independent School District (ISD) facilities in the City of Sugar Land.
- **Goal 9:** Collaborate with community planning partners to develop and/or update emergency plans to address specific hazards and outline mitigation measures.
- **Goal 10:** Utilize public information tools to communicate strategies for mitigating hazards to the general public.
- **Goal 11:** Partner with public health authorities and non-profit organizations to mitigate public health threats.

¹⁴ Multihazard Mitigation Council. (2005, December) Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities. Retrived August 28, 2013, from http://c.ymcdn.com/sites/www.nibs.org/resource/resmgr/MMC/hms_vol2_ch1-7.pdf

Note: The hazard mitigation planning team identified a number of hazard mitigation strategies that, since the inception of the plan, have been completed. The completed tasks are listed in the plan as evidence to planning participants that their ideas were valued and completed by the City.

Table 5-1
City of Sugar Land Mitigation Strategies

Goal 1: Provide power sources for critical facilities throughout Sugar Land.

Objective 1: Identify Sugar Land facilities that are ill-equipped for power outages.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
1.1.1	Purchase and install a generator at the Fire Administration Building.	Severe thunderstorms, Severe winter storms, Hail storms, Tornadoes, Hurricanes – tropical storms, Lightning, Terrorism.	City of Sugar Land Emergency Management	Complete by 2016-2018	\$250,000	\$1,000,000	Grants, Houston Galveston Advisory Council
1.1.2	Purchase and install a generator for Imperial Park Recreation Center for use as a shelter location.	Severe thunderstorms, Severe winter storms, Hail storms, Tornadoes, Hurricanes – tropical storms, Lightning, Terrorism.	City of Sugar Land Emergency Management	Complete by 2016-2018	\$250,000	\$1,000,000	Grants, Houston Galveston Advisory Council
1.1.3	Purchase and install a generator for Harmon Senior Center for use as a community shelter location.	Severe thunderstorms, Severe winter storms, Hail storms, Tornadoes, Hurricanes – tropical storms, Lightning, Terrorism.	City of Sugar Land Emergency Management	Complete by 2016-2018	\$250,000	\$1,000,000	Grants, Houston Galveston Advisory Council

Objective 2: Ensure proper generator power is available for schools designated as City of Sugar Land emergency shelters.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
1.2.1	Install emergency power system in Kempner High School to ensure continuous supply during power outages.	Severe thunderstorms, Winter storms, Hail storms, Tornadoes, Hurricanes –	Fort Bend ISD	March 2016	TBD	TBD	Fort Bend ISD, City of Sugar Land

Section 5

tropical storms,
Lightning,
Terrorism.

Goal 2: Ensure the City of Sugar Land has all necessary response equipment in place.

Objective 1: Improve emergency notification systems at all Fort Bend ISD City of Sugar Land schools.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
2.1.1	Purchase and install emergency notification systems at all City of Sugar Land schools to ensure they have the newest technology, including integrated siren and strobes and alert beacons.	Severe thunderstorms, Winter storms, Hail storms, Tornadoes, Hurricanes – tropical storms, Lightning, Terrorism, Dam and Levee Failures	Fort Bend ISD	August 2015	\$400,000	\$1,600,000	Fort Bend ISD

Objective 2: Replace the City of Sugar Land's mobile command vehicle.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
2.2.1.	Purchase of a command vehicle for the City of Sugar Land's needs. Purchase it.	Severe thunderstorms, Winter storms, Hail storms, Tornadoes, Hurricanes – tropical storms, Lightning, Terrorism, Aircraft incidents	City of Sugar Land Emergency Management	2013-2016	\$1,000,000	\$4,000,000	City of Sugar Land

Objective 3: Install equipment to protect City facilities and equipment from lightning strikes.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
2.3.1	Install lightning rods on existing and future communication infrastructure and other critical facilities	Lightning	City of Sugar Land Emergency Management	2014-2017	21,769.00	2,000,000.00	Grants, City of Sugar Land
2.3.2	Purchase and install new electronic equipment to protect equipment against power surges	Lightning	City of Sugar Land Emergency Management	2016	25,000.00	10,000,000.00	City of Sugar Land

Goal 3: Harden City of Sugar Land critical facilities against high winds and hail.

Objective 1: Ensure windows in Fort Bend ISD City of Sugar Land schools can withstand high winds.

MITIGATION STRATEGIES

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
3.1.1	Apply security window film to existing windows in Fort Bend ISD City of Sugar Land schools to protect students from wind-borne debris during high winds situations such as thunderstorms and tornadoes.	Tornadoes, Severe Thunderstorms and High Winds, Hurricanes/Tropical Storms, Hail	Fort Bend ISD	August 2014	\$500,000	\$2,000,000	Fort Bend ISD

Objective 2: Ensure windows in City of Sugar Land facilities can withstand high winds, hail, and other hazards.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
3.2.2	Install Armor Glass®, tinting all windows in fifteen buildings in the City of Sugar Land.	Tornadoes, Severe Thunderstorms and High Winds, Hurricanes/Tropical Storms, Hail	City of Sugar Land	2013-2016	\$500,000	\$2,000,000	Grant funding, Houston UASI, City of Sugar Land

Goal 4: Utilize Federal flood prevention programs to ensure reduced vulnerability to flooding.

Objective 1: Maintain the participation of the City of Sugar Land in Federally funding flood prevention programs.

Action	Action/Project Description	Hazard(s) Addressed	Projected Time to Completion	Department or Agency Responsible	Estimated Cost	Estimated Benefit	Funding Sources
4.1.1	Create a program to inform individuals of potential flood hazards and planning initiatives.	Flooding	2015-2020	City of Sugar Land Emergency Management	\$10,000	\$40,000	City of Sugar Land; NFIP
4.1.2	Develop a program to lower the Community Rating System (CRS) number from 7 to 6.	Flooding	2015-2020	City of Sugar Land Emergency Management	\$10,000	\$40,000	City of Sugar Land; CRS

Goal 5: Ensure proper drainage of storm water throughout Sugar Land.

Objective 1: Identify and conduct projects to improve drainage of storm water in certain communities in Sugar Land.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
5.1.1	Design and construct an offline pond in the western portion of the existing detention basin in Covington Woods to reduce storm event peak and mitigate downstream impacts.	Flooding	City of Sugar Land Engineering Department	2015-2017	\$2,040,000	\$14,000,000	Federal Grant funding, City of Sugar Land

Section 5

5.1.2	Design and construct new reinforced concrete boxes south on Longview Drive to divert flow to East Sugar Creek and new storm inlets along Longview Drive to reduce backwater surcharging.	Flooding	City of Sugar Land Engineering Department	2015-2017	\$5,850,000	\$24,000,000	Federal Grant funding, City of Sugar Land
5.1.3	Design and construct a new efficient storm water outfall and new trunk line to extend north from Ditch A-22 along Bournewood Dr. to Bramblebury Dr. to mitigate subdivision and street flooding impacts.	Flooding	City of Sugar Land Engineering Department	2015-2017	\$5,830,000	\$24,000,000	Federal Grant funding, City of Sugar Land

Goal 6: Participate in the intelligence cycle as it relates to terrorist events and how they are conducted throughout the U.S. and overseas.

Objective 1: Participate on the FBI's Joint Terrorism Task Force.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
6.1.1	Assign an existing position to actively participate in FBI JTTF investigations part-time.	Terrorism	City of Sugar Land Police Department	2015-2020	\$30,000	\$120,000	City of Sugar Land

Objective 2: Participate in the Department of Homeland Security's Fusion Center.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
6.2.1	Submit and disseminate information as it relates to terrorism to the Department of Homeland Security's Fusion Center.	Terrorism	City of Sugar Land Police Department	2015-2020	No cost	Facilitate information sharing	City of Sugar Land

Goal 7: Identify and address potential threats for specific location and special event occurrences.

Objective 1: Ensure threat assessments are conducted by trained personnel.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
7.1.1	Schedule formalized training on conducting threat assessments.	Terrorism	City of Sugar Land Police Department	2013-2015	\$2,000	\$8,000	Department of Homeland Security
7.1.2	Conduct in-house training for SLPD	Terrorism	City of Sugar Land Police Department	2013-2015	-	Staff trained to conduct threat	City of Sugar Land

MITIGATION STRATEGIES

supervisors and
designated city
departments.

assessments

Objective 2: Adjust the City of Sugar Land's special events action plan format to include a threat assessment.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
7.2.1	Design a threat assessment form for special events.	Terrorism	City of Sugar Land Police Department	2013-2015	-	Organized method for analyzing threats.	City of Sugar Land
7.2.2	Revise city policy to include the threat assessment form is a standard part of any special event action plan.	Terrorism	City of Sugar Land Police Department	2013-2015	-	Organized method for analyzing threats.	City of Sugar Land

Objective 3: Plan responses at specific standing locations.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
7.3.1	Identify the top five potential targets for terrorism in the City of Sugar Land.	Terrorism	City of Sugar Land Police Department	2013-2014	-	Prioritized list to concentrate planning efforts.	City of Sugar Land
7.3.2	Conduct a planned response for those listed.	Terrorism	City of Sugar Land Police Department	2013-2014	-	Organized response to terrorism.	City of Sugar Land
7.3.3	Work with the management of those facilities on planning and training.	Terrorism	City of Sugar Land Police Department	2013-2014	-	Staff trained to respond to terrorism.	City of Sugar Land

Goal 8: Provide a more secure environment for Fort Bend County Independent School District (ISD) facilities in the City of Sugar Land.

Objective 1: Increase security measures at doors and access points throughout City of Sugar Land schools by improving physical infrastructure.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
8.1.1	Install security vestibules with electronic door controllers at the following schools: Clement High School Dulles High School Kempner High School M.R. Wood Technical Education	Terrorism	Fort Bend ISD	August 2015	\$490,000	\$2,000,000	Fort Bend ISD

Section 5

Center
First Colony Middle
School
Fort Settlement Middle
School
Sugar Land Middle
School
Barrington Place
Elementary School
Colony Meadows
Elementary School
Commonwealth
Elementary School
Dulles Elementary
School
Highlands Elementary
School
Lakeview Elementary
School

8.1.3	Install electronic access controls on exterior doors on all Fort Bend ISD City of Sugar Land schools, including access controls at front doors, as well as kitchen, security vestibule, staff, custodial, athletic, fine arts, bus loading, commons, and all other exterior corridor doors.	Terrorism	Fort Bend ISD	August 2015	\$800,000	\$3,200,000	Fort Bend ISD
-------	---	-----------	---------------	-------------	-----------	-------------	---------------

Objective 2: Update security technology at schools throughout the City of Sugar Land.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
8.2.1	Install video intercom systems that allow schools to grant access to selected doors at their facilities, thus increasing student mobility and school security for the following schools: Clements High School Dulles High School M.R. Wood Technical Education Center Dulles Middle School First Colony Middle	Terrorism	Fort Bend ISD	August 2015	\$148,000	\$800,000	Fort Bend ISD

School
 Fort Settlement Middle
 School
 Sugar Land Middle
 School
 Austin Parkway
 Elementary School
 Barrington Place
 Elementary Place
 Colony Bend
 Elementary School
 Colony Meadows
 Elementary School
 Commonwealth
 Elementary School
 Cornerstone Elementary
 School
 Dulles Elementary
 School
 Highlands Elementary
 School
 Lakeview Elementary
 School
 Settlers Way
 Elementary School
 Sugar Mill Elementary
 School

Update security
 cameras from analog
 systems to centralized
 network camera
 solutions by replacing all
 digital video recorders
 with encoders and
 ensuring all replacement
 cameras are network IP
 cameras. Note: High
 schools require 150-200
 cameras; middle
 schools require 100-125
 cameras; elementary
 schools require 32-64
 cameras.

8.2.2	ensuring all replacement cameras are network IP cameras. Note: High schools require 150-200 cameras; middle schools require 100-125 cameras; elementary schools require 32-64 cameras.	Terrorism	Fort Bend ISD	August 2016	\$5,000,000	\$20,000,000	Fort Bend ISD
-------	--	-----------	---------------	-------------	-------------	--------------	---------------

Goal 9: Collaborate with community planning partners to develop and/or update emergency plans to address specific hazards and outline mitigation measures.

Objective 1: Plan response to extreme temperatures (heat).

9.1.1	Prepare and implement an extreme heat plan. Outline when alerts are to be issued and what actions will be taken.	Extreme Temperatures	City of Sugar Land Office of Emergency Management	2014-2015	No cost	Safety of vulnerable populations and city facilities	City of Sugar Land
9.1.2	Develop an extreme heat outreach program	Extreme Temperatures	City of Sugar Land Office of	2014-2016	\$10,000	Increased public	City of Sugar Land

Section 5

for City of Sugar Land citizens.

Emergency Management

knowledge of various forms of assistance; increased public health and safety

9.1.3	Create a program with non-profit organizations to distribution of fans and portable air conditioning units to venerable Sugar Land residents.	Extreme Temperatures	City of Sugar Land Office of Emergency Management	2015-2017	No cost	Safety of vulnerable populations.	City of Sugar Land
-------	---	----------------------	---	-----------	---------	-----------------------------------	--------------------

Objective 3: Mitigate the effects of a drought on the water supply.

9.3.1	Co-host a conference for businesses on water irrigation systems.	Drought	City of Sugar Land Office of Emergency Management	Completed	No cost	Collaboration with businesses in water conservation. Inform homeowners and business owners to plant landscapes that conserve water.	City of Sugar Land
9.3.2	Conduct a program on an annual basis to inform the public of the Texas Smart Scape Program	Drought	City of Sugar Land Office of Emergency Management	December 2016	No cost		City of Sugar Land
9.3.3	Install low water fixtures in city facilities	Drought	City of Sugar Land facilities	December 2017	\$150,000	\$600,000	City of Sugar Land

Objective 4: Mitigate the consequences of dam and levee failure.

9.4.1	Develop and implement emergency dam plans and procedures.	Dam/Levee Failure	City of Sugar Land Office of Emergency Management	December 2016	No cost	Strengthen dam plans.	City of Sugar Land
9.4.2	Retrofit Dam #3 to safely pass 75% of the PMF.	Dam/Levee Failure	City of Sugar Land Engineering Department	December 2017	Has not yet been determined	Protection of properties in potential inundation areas.	Grant funds, City of Sugar Land
9.4.3	Develop and implement a procedure to ensure dam/levee inundation maps are current.	Dam/Levee Failure	City of Sugar Land Office of Emergency Management	December 2016	No cost	Maintain a schedule to keep maps are current.	City of Sugar Land
9.4.4	Implement an inspection maintenance, and enforcement program to help ensure continued structural integrity of dams and levees	Dam/Levee Failure	City of Sugar Land Office of Emergency Management	December 2016	No cost	Inspection, maintenance, and enforcement program.	City of Sugar Land
9.4.5	Educate the public regarding dam and levee and mitigation actions being taken by	Dam/Levee Failure	City of Sugar Land Office of Emergency Management	December 2016	5,000	Safety of individuals and property in at risk areas.	Grant funds, City of Sugar Land

the city and actions they can take to protect their lives and property, including the purchase of flood insurance, in the event of a dam or levee breach.

Objective 5: Mitigate disruptions to City operations.

9.5.1	Review and update COOP plan succession of leadership procedures.	Infectious Disease Outbreak	City of Sugar Land Office of Emergency Management	No cost	No cost	Updated succession plan to mitigate disruption to operations.	City of Sugar Land
-------	--	-----------------------------	---	---------	---------	---	--------------------

Objective 6: Coordinate with Fort Bend County to develop strategies for mitigating hazardous materials incidents.

9.6.1	Coordinate with Fort Bend County Office of Emergency Management to review and update the Hazardous Materials and Oil Spill Response Annex.	Hazardous Materials	City of Sugar Land Office of Emergency Management	August 2014	No cost	Updated HAZMAT plan.	City of Sugar Land and Fort Bend County
-------	--	---------------------	---	-------------	---------	----------------------	---

Objective 7: Ensure there is an adequate supply of fuel to respond to emergencies.

9.7.1	Identify primary and alternate fuel sources and add them to the City Continuity of Operations plan.	Energy/Fuel Shortage	City of Sugar Land Office of Emergency Management	Completed	No cost	Identified backup sources of fuel.	City of Sugar Land
-------	---	----------------------	---	-----------	---------	------------------------------------	--------------------

Objective 8: Collaborate with the Sugar Land Regional Airport to address possible threats from aircraft accidents.

9.8.1	Purchase an airport fire truck to mitigate the effects of an aircraft crash at the airport.	Aircraft Accident	City of Sugar Land Office of Emergency Management	2015-2020	1.0 million	983.0 million (Value of aircraft housed at airport)	UASI/FAA
9.8.2	Develop a system to be alerted when an incident might be developing such as an airplane in trouble.	Aircraft Accident	City of Sugar Land Office of Emergency Management	2015-2020	No cost	Alert might afford opportunity to warn public.	City of Sugar Land

Goal 10: Utilize public information tools to communicate strategies for mitigating hazards to the general public.

Objective 1: Offer guidance to the public for protection against specific threats.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
10.1.1	Provide guidance to the public regarding prevention of damage and injuries from lighting	Lightning	City of Sugar Land Emergency Management	Webpage on going	No cost	Reduced property damage and injuries as a result of	City of Sugar Land

Section 5

						lightning.	
10.1.2	Educate the public on the importance of water conservation and steps the public can take to limit water waste	Drought	City of Sugar Land Emergency Management	On-going	No cost	Water conservation.	City of Sugar Land
10.1.3	Provide guidance to the public in shelter in place procedures.	Hazardous Materials	City of Sugar Land Office of Emergency Management	December 2014	No cost	Protection to individuals from hazardous spills and releases. Increased public knowledge of various forms of assistance; increased public health and safety	City of Sugar Land
10.1.4	Develop a severe winter storm outreach program for City of Sugar Land citizens.	Severe Winter Storms	City of Sugar Land Office of Emergency Management	2014-2016	\$10,000		City of Sugar Land

Goal 11: Partner with public health authorities and non-profit organizations to mitigate public health threats.

Objective 1: Mitigate the effects of an infectious disease outbreak.

Action	Action/Project Description	Hazard(s) Addressed	Department or Agency Responsible	Time Line	Estimated Cost	Estimated Benefit	Funding Sources
11.1.1	Coordinate with Fort Bend County Health and Human Services in planning and exercises for vaccination and prophylaxis of the general public and first responders.	Infectious Disease Outbreak	City of Sugar Land Office of Emergency Management	October 2014	1,000.00	15,000.00	City of Sugar Land and Public Health Preparedness Grant through Fort Bend County

Public Information and Awareness Strategies. The City of Sugar Land is committed to ensuring that the public is well-informed of the actions they are taking to keep the community safe. Every mitigation goal and objective listed above will have a communications strategy that will include public notification of the project and its status through a variety of forms. These forms of communication may include, but are not limited to; posting information on the City of Sugar Land website, issuing press releases to ensure the media has accurate information to disseminate, sending out email notifications, and posting pertinent information in the City of Sugar Land's administration facilities.

Section 6

EXECUTING THE PLAN

44 CFR Requirement 201.6 (c) (4)(i)

[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

6.1 Plan Implementation

The City of Sugar Land hazard mitigation planning process was overseen by the City of Sugar Land Department of Emergency Management. The City of Sugar Land Hazard Mitigation Plan (HMP) was submitted to the Texas Division of Emergency Management and the Federal Emergency Management Agency (FEMA) for approval. The City of Sugar Land City Council formally adopted the plan by resolution in accordance with the Disaster Mitigation Act of 2000.

The City of Sugar Land plan is responsible for implementing specific mitigation actions as prescribed in the mitigation strategies. In each mitigation strategy, every proposed action is assigned to a specific department or agency in order to assign responsibility and accountability and increase the likelihood of subsequent implementation. This approach ensures accountability to the department level, while providing the Department of Emergency Management with oversight responsibilities.

In addition to the assignment of a lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. As necessary, the City of Sugar Land seeks outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the mitigation strategies.

6.2 Evaluation

All members of the City of Sugar Land Hazard Mitigation Planning Committee (HMPC) and the Department of Emergency Management director will be responsible for ensuring that the City of Sugar Land HMP is evaluated as required. The evaluation will include analyzing current mitigation projects, evaluating success, and reevaluating future mitigation needs and prioritization based upon changes in needs and/or capabilities of City of Sugar Land.

The HMPC will reconvene annually to ensure that projects are on track and to reevaluate the mitigation goals, objectives, and action steps. The mitigation plan shall be viewed as an evolving, dynamic document.

6.3 Plan Update

The Disaster Mitigation Act of 2000 requires that the City of Sugar Land HMP be updated at least once every five years. The City of Sugar Land Department of Emergency Management director will be responsible for ensuring that this requirement is met. The City of Sugar Land Department of Emergency Management director and the HMPC will annually review the plan for needed updates. The HMPC will be involved in this process to ensure all departments and private sector partners provide input into the planning process. The public will be invited to participate in this process through public hearings.

6.4 Plan Maintenance

44 CFR Requirement 201.6 (c) (5)

The plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County commissioner, Tribal Council). For multijurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

It is the intention of the City of Sugar Land to formally adopt the HMP after each maintenance revision. Once all participants adopt the changes, the revised plan will be submitted to the Texas Division of Emergency Management and FEMA. The plan will be revised and maintained as required under the guidance of the HMPC and formally adopted by the City Council after each revision.

44 CFR Requirement 201.6 (c) (4)(iii)

The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

Public participation will be sought throughout the implementation, evaluation, and maintenance of the HMP. This participation will be sought in a multitude of ways, including but not limited to periodic presentations on the plan's progress to elected officials, schools, or other community groups; annual questionnaires or surveys; public meetings; and postings on social media and interactive websites.

6.5 Incorporation into Existing Planning Mechanisms

It will be the responsibility of the Department of Emergency Management to determine additional implementation procedures when appropriate. This includes integrating the requirements of the City of Sugar Land HMP into other local planning documents, processes, or mechanisms such as the following:

- Comprehensive plans
- Strategic plans
- Capital improvement plans
- Growth management plans

- Ordinances, resolutions, and regulations
- Continuity of operations plans

Opportunities to integrate the requirements of this plan into other local planning mechanisms will continue to be identified through future meetings of the HMPC and through the five-year review process as required by FEMA.

The primary means for integrating mitigation strategies into other planning mechanisms will be through the revision, update, and implementation of plans that require specific planning and administrative tasks (for example, plan amendments, ordinance revisions, capital improvement projects, etc.).

The members of the HMPC will remain charged with ensuring that the goals and strategies of new and updated planning documents are consistent with the goals and actions of the City of Sugar Land HMP and will not contribute to increased hazard vulnerability in City of Sugar Land.

During the planning process for new and updated local planning documents, such as a comprehensive plan, capital improvements plan, or emergency management plan, the City of Sugar Land will provide a copy of the City of Sugar Land HMP to the appropriate parties and recommend that all goals and strategies of new and updated planning documents are consistent with and support the goals of the City of Sugar Land HMP and will not contribute to increased hazards in the City.

Although it is recognized that there are many possible benefits to integrating components of this plan into other planning mechanisms, the development and maintenance of this stand-alone HMP is deemed by the HMPC to be the most effective and appropriate method to ensure implementation of local hazard mitigation actions at this time.

All organizations will incorporate the City of Sugar Land HMP into existing plans in an effort to mitigate the impact of future disasters. The following is a list of existing plans in which hazard mitigation planning efforts will be integrated:

Table 6-1
Plans in Which Hazard Mitigation Planning Efforts Will Be Integrated

Type of Plan	Department-Authority-Program Responsible	Review Timeline	New or Existing?	Actions to be Integrated
2012 Comprehensive Plan	City Administration	As needed to address changes in policy, population growth and capital improvements.	Existing	Land use policies and planning.
Flood Management Plan	Public Works	Annually	Existing	Include hazard mitigation strategies in the Flood Management Plan
2007 Master Drainage Plan	City Engineer	A component of the 2012 Comprehensive Plan	Existing	include hazard mitigation strategies in the Master Drainage Plan

Section 6

Emergency Management Plan	Fire Department - Emergency Management	Every 5 years	Existing	Integrate hazard mitigation planning with other emergency management planning activities.
Fort Bend County Hazard Mitigation Plan	Fort Bend County Office of Emergency Management	Every 5 years	Existing	Coordinate hazard mitigation planning activities and actions with Fort Bend County.

7.1 Conclusion

Through the development of this plan, the City of Sugar Land has developed a thorough hazard history, an inventory of critical facilities, and an updated contact list for emergency contacts at critical facilities. This data, when used in conjunction with the updated information about hazard threats and vulnerabilities, will prove to be invaluable to the City of Sugar Land and its citizens.

Natural and technological hazards have been identified citywide. Possible mitigation projects that would reduce the risk of lives and property due to the identified threats have been compiled and prioritized.

The creation of the City of Sugar Land Hazard Mitigation Planning Committee has brought together stakeholders from the government and community organizations into one planning team. This group has been able to work together effectively and efficiently to produce this document and establish a greater awareness of our risks and our mitigation strategies.

This plan will continue to evolve as necessary to properly represent the threats and vulnerabilities affecting the City of Sugar Land.

Continued public participation is encouraged and will be continued through the ongoing hazard mitigation process.

7.2 References

- Publications
 - Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation How-to-Guides #1, 2, 3, 7
 - City of Sugar Land Comprehensive Plan
- Websites
 - FEMA (www.fema.gov)
 - Texas Division of Emergency Management (www.TDEM.state.mn.us)
 - City of Sugar Land (www.co.sherburne.mn.us)
 - National Climatic Data Center (www.ncdc.noaa.gov)
 - National Weather Service (www.srh.noaa.gov/ffc/default.html)
- Other Sources
 - SHELDUS
 - Texas Department of Natural Resources

Section 7

- National Weather Service
- U.S. Geological Survey

Appendix A

ACRONYMS AND ABBREVIATIONS

ASL	At Sea Level
EF Scale	Enhanced Fujita Scale
EOC	Emergency Operations Center
ETJ	Extraterritorial Jurisdiction
FEMA	Federal Emergency Management Agency
GIS	Geospatial Information Systems
HMP	Hazard Mitigation Plan
HMPC	Hazard Mitigation Planning Committee
ICS	Incident Command System
IMT	Incident Management Team
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NID	National Inventory of Dams
NOAA	National Oceanic Atmospheric Agency
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
SHELDUS	Special Hazards Events List Database for the United States
TDEM	Texas Division of Emergency Management
USGS	United States Geological Survey

Appendix B

PUBLIC MEETING NOTICES AND SUMMARIES

City of Sugar Land, Texas Hazard Mitigation Plan Project Kickoff Meeting/Public Meeting #1 Summary

April 3, 2013

Purpose

The purpose of the meeting was to introduce City of Sugar Land stakeholders to the hazard mitigation planning process. The meeting, which was held in the evening, also gave stakeholders an opportunity to discuss their involvement in the project, the phases of the project, and the time line for each phase.

Meeting Attendees

Name	Organization	Position	Phone Number	E-mail
Pat Hughes	City of Sugar Land Emergency Management	Director/Emergency Management Coordinator	281-275- 2875	phughes@sugarlandtx.gov
Frank Garza	City of Sugar Land Emergency Management	Emergency Management Specialist	281-275-2805	fgarza@sugarlandtx.gov
John Nelson	Citizen of Sugar Land		832-459-3120	john@flatline.com
Michael Fjetland	Armor Glass	President	713-213-5080	michail@armorglass.com
Doug Adolph	City of Sugar Land Communications	Assistant Communications Director	281-275- 2724	dadolph@sugarlandtx.gov
Stuart Denton	City of Sugar Land Police Department	Captain	281-275-2500	sdenton@sugarlandtx.gov
Bruce McFarland	NALCO	SH&E Superintendent	281-263-7845	vbmcfarland@nalco.com
Dionne Bryant	City of Sugar Land GIS/IT	GIS Specialist	281-275-2709	dbryant@sugarlandtx.gov
Lisa Kocich-Meyer	City of Sugar Land TLRP	Principal Planner	281-275-2311	lmk@sugarlandtx.gov
Pat Pollicoff	City of Sugar Land Communications	Director	281-275-2238	ppollicoff@sugarlandtx.gov
Howard Christian	City of Sugar Land Utilities	Assistant Director	281-275-2456	hchristian@sugarlandtx.gov
Stephanie Russell	City of Sugar Land Public Works	Administrative Manager	281-275-2480	srussell@sugarlandtx.gov

Appendix B

Name	Organization	Position	Phone Number	E-mail
Kip L. Hilgers	City of Sugar Land Fire Department	Captain	281-222-1040	klh@sugarlandtx.gov
Joe Anzaldua	EMS	EMS Medical Director/ Local Health Authority	713-822-5324	drjoe_anzaldua@comcast.net
Caroline Egan	Fort Bend County Office of Emergency Management	Planning Coordinator	281-342-6285	caroline.egan@co.fort-bend.tx.us
Doug Schomburg	City of Sugar Land Planning and Code Services	Director	281-275-2738	dshomburg@sugarlandtx.gov
Rob Valenzuela	City of Sugar Land Engineering	Assistant City Engineer	281-275-2780	rvalenzuela@sugarlandtx.gov

Host: Pat Hughes, Emergency Management Coordinator, City of Sugar Land

Consultants: Brian Rutherford and Tamara Habib, SAIC

Handouts: Presentation slides, mitigation surveys

Overview of Activities

WELCOME AND INTRODUCTIONS

Mr. Patrick Hughes opened the meeting by thanking those in attendance for participating in the project and asking everyone to introduce themselves. A full roster of attendees can be found above. He then introduced Mr. Brian Rutherford of SAIC, who provided an overview of SAIC's hazard mitigation planning experience.

Mr. Rutherford presented a summary of the hazard mitigation planning project. Below is a summary of the key discussion points in the presentation. The full presentation is available through the City of Sugar Land.

PURPOSE AND IMPORTANCE OF HAZARD MITIGATION PLANNING

Hazard mitigation planning is required under the Disaster Mitigation Act of 2000. It guides post-disaster recovery, engages multiple community stakeholders, promotes public participation, evaluates hazards and risks, builds support for mitigation activities, helps educate community officials, and develops more effective community policies. In the future, federal funding for mitigation projects will be contingent upon having a hazard mitigation plan or being in the process of developing one.

The benefits of a hazard mitigation plan include reducing vulnerability to future hazards, saving lives and property, gaining disaster funding, maintaining economic stability, and expediting the recovery period.

APPROACH TO HAZARD MITIGATION PLANNING

SAIC's approach to hazard mitigation planning complies with industry standards and includes four phases.

The first phase of planning involves initiating the planning project and organizing resources. A kickoff meeting with the Hazard Mitigation Planning Team will occur and data collection will

begin. The first public meeting will also occur during this phase. SAIC will provide public meeting minutes to the project sponsor.

The second phase involves identifying hazards and gathering preliminary risk assessment results. This includes developing a base list of hazards, gathering information about those hazards, and conducting a risk assessment. Additionally, the second phase involves drafting a findings report through a detailed risk assessment and vulnerability assessment. During the second phase, mitigation strategies will also be developed. In addition to drafting the mitigation strategies and actions, the second public meeting will be conducted during this phase. SAIC will provide public meeting minutes to the project sponsor.

The draft hazard mitigation plan will be completed during the third phase. This phase includes submitting draft plans to City of Sugar Land officials for review and presenting the draft plan to the public through the third public meeting to be held in Sugar Land. SAIC will provide public meeting minutes to the project sponsor.

The fourth phase of the project includes submitting draft plans to the State of Texas and the Federal Emergency Management Agency (FEMA) officials for review. Following the four phases, the hazard mitigation plan will be presented to the City of Sugar Land for adoption and Sugar Land personnel can begin working toward achieving the plan's goals and strategies. Plan maintenance, including identifying the plan's successes and areas for improvement, will be an ongoing process.

ADDITIONAL DISCUSSION

Ms. Tamara Habib described the outline of the hazard mitigation plan and discussed the content of each section that will be included in the plan.

Ms. Habib discussed natural and technological hazards that the City of Sugar Land may be susceptible too. The following base list of hazards was identified:

Natural Hazards	Technological Hazards
Severe winter storms	Dam/levee failure
Severe thunderstorms	Terrorism
Lightning	Hazardous materials spills
Extreme temperatures	Energy/fuel shortage
Hailstorms	Aircraft accidents
Wildfires	Critical facilities and infrastructure
Flooding	
Drought	
Pandemic/epidemics	
Tropical storms/Hurricanes	
Tornadoes	

Appendix B

Ms. Habib described the hazard profile, which includes hazard identification, hazard profiling, assets exposed to the hazard, vulnerability, multijurisdictional concerns, and land use plans and development trends.

Ms. Habib discussed the mitigation strategy. The strategy is a list of goals for mitigating the identified hazards and the steps needed to achieve them. She provided examples of mitigation strategies such as warning sirens and safe shelters.

Ms. Habib explained the data collection surveys. There are five different surveys: a jurisdictional survey (all hazards), agriculture survey (disease/vectors, drought), health services survey (pandemics/epidemics), law enforcement survey (terrorism), and fire survey (wildfires, hazmat, and urban fires). Mr. Hughes will support Mr. Rutherford in the distribution of the surveys to the jurisdictions and agencies.

Ms. Habib also explained the use of an online survey developed for the project. The survey was designed to be accessed by the general public to collect information from residents and employees regarding perceived threats and preparedness levels. The survey was distributed through Survey Monkey.

ACTION ITEMS/ASSIGNMENTS

- SAIC will send the surveys in electronic format to Mr. Hughes.
- Mr. Hughes will distribute the surveys to the appropriate city departments and stakeholders for completion by April 17, 2013.
- SAIC will collect the surveys, compile the data, and coordinate with the City of Sugar Land in the development of hazard profiles.

NEXT MEETING

The date of the next public meeting has been tentatively set for May 29, 2013. SAIC will conduct the meeting to obtain feedback on the draft hazard identification, risk assessment, and mitigation strategies developed from the survey data.

City of Sugar Land, Texas
Hazard Mitigation Plan Project
Kickoff Meeting/Public Meeting #2 Summary

June 20, 2013

Purpose

The purpose of the meeting was to discuss the risk and vulnerability assessment and gather input on potential hazard mitigation strategies.

Meeting Attendees

Name	Organization	Position	Phone Number	E-mail
Tamara Habib	Science Applications International Corporation (SAIC)	Consultant	312-848-4318	tamara.a.habib@saic.com
Pat Hughes	City of Sugar Land Emergency Management	Director/Emergency Management Coordinator	281-275- 2875	phughes@sugarlandtx.gov
Stuart Denton	City of Sugar Land Police Department	Captain	281-275-2500	sdenton@sugarlandtx.gov
Dionne Bryant	City of Sugar Land GIS/IT	GIS Specialist	281-275-2709	dbryant@sugarlandtx.gov
Lisa Kocich-Meyer	City of Sugar Land Transportation and Long Range Planning	Principal Planner	281-275-2311	lmk@sugarlandtx.gov
Pat Pollicoff	City of Sugar Land Communications	Director	281-275-2238	ppollicoff@sugarlandtx.gov
Brian Rutherford	SAIC	Consultant	281-414-6741	brian.p.rutherford@saic.gov
Sharon Shapiro	City of Sugar Land Emergency Management	Executive Secretary	281-275-2310	sshapiro@sugarlandtx.gov
Doug Schomburg	City of Sugar Land Planning and Code Services	Director	281-275-2738	dshomburg@sugarlandtx.gov

Host: Pat Hughes, Emergency Management Coordinator, City of Sugar Land

Consultants: Brian Rutherford and Tamara Habib, SAIC

Handouts: Presentation slides, risk and vulnerability assessment, hazard mitigation strategy

Overview of Activities

Welcome and Introductions

Ms. Tamara Habib opened the meeting by asking attendees to introduce themselves. A full roster of attendees can be found above. Ms. Habib shared the agenda of the meeting, which consisted of the following:

Appendix B

- Introductions
- Project status
- Risk and vulnerability assessment
- Mitigation strategies
- Next steps
- Questions and answers
- Adjourn

Below is a summary of the key discussion points in the presentation. The full presentation is available through the City of Sugar Land.

Project Status

Ms. Habib reviewed the project phases. Phase 1 of the project has been completed. Phase 2 consists of development of the risk and vulnerability assessment, development of a hazard mitigation strategy, and conduct of the second planning/public meeting. The next phase, phase 3, will consist of development of the initial draft of the hazard mitigation plan.

Ms. Habib then walked attendees through the risk and vulnerability assessment and the hazard mitigation strategy.

Risk and Vulnerability Assessment

The risk assessment measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural and technological hazards by assessing the vulnerability of people, buildings, and infrastructure to natural and technological disasters. SAIC used several methods to identify risks to the community:

- Evaluating historical data from scientific and news media sources
- Soliciting opinions and experiences from participating jurisdictions and Sugar Land residents
- Surveying risks identified in the State of Texas Hazard Mitigation Plan (HMP) that were pertinent to the city

A copy of the draft risk and vulnerability assessment is available through the City of Sugar Land. Key discussion points concerning the risk and vulnerability assessment include the following:

- Remove “hurricane” from the list of vulnerabilities not included.
- Add information regarding property damage from local hail incidents.
- The City of Sugar Land has no record of wildfires within the city limits, but the City has been affected by smoke from fires in Mexico and in neighboring jurisdictions.
- In 2012, the City of Sugar Land was affected by drought. Incidents included broken pipes cracked sidewalks and foundations. The City spent approximately \$2 million dollars in repairs to sidewalks and streets.

- SAIC collected a chart from the Fort Bend County Department of Health and Human Services (FBCHHS) but additional information (such as a narrative) is needed to explain the information in the chart.
- Sugar Land does not have a dam, but Smithers Lake has a dam that could affect the City of Sugar Land in the event of a dam failure. The lake is used by a utility company as a cooling lake. Additional information is needed about the dam for inclusion in the risk and vulnerability assessment.
- Sugar Land Regional Airport has a train track next to it. Trains that use the tracks haul potentially hazardous materials from the Houston Ship channel area. Meeting attendees discussed the potential hazard of a plane crashing into a rail car carrying hazardous materials.
- Attendees discussed terrorism as a potential threat to the City. Potential terrorist targets include Constellation Field, home of the Sugar Land Skeeters minor league baseball team, and NALCO, a local chemical facility. The City is also building a festival site and a community center, which could become potential terrorist sites.

Hazard Mitigation Strategy

The Hazard Mitigation Strategy consists of a list of goals for mitigating the identified hazards and the steps needed to achieve them. SAIC used information collected from surveys issued to Sugar Land departments to assemble the hazard mitigation strategy. The discussion regarding the hazard mitigation strategy centered on filling in gaps that were missing from the surveys submitted from City departments, such as timelines for completion of actions identified and the identification of possible funding sources. Timelines assume funding is available for such purchases. Key discussion points concerning the hazard mitigation strategy include the following:

- Target completion date for protective glass tinting will be 2016.
- Mr. Hughes will check with the Engineering Department to provide a timeline and potential funding sources for projects they identified.
- Target completion date for installation of generators is three to five years.
- Tree management debris impact involves having prepositioned contracts for debris management. Mr. Hughes will follow up on the timeline and potential funding sources.
- Purchase of a new command vehicle will most likely be funded through the city.
- Timeline for participation in the FBI taskforce will be ongoing. Estimated cost will be about \$30,000 per year with a potential \$120,000 benefit to the city.
- Timeline for participation in the Homeland Security Fusion Center is ongoing. Estimated cost for participation is zero.
- The timeline for ensuring threat assessments are conducted by trained personnel is two years.
- The timeline for designing a threat assessment for special events is 1 year.
- The timeline for revising city policy to include that the threat assessment form is a standard part of any special event action plan is two years.
- The timeline for identifying the top five potential targets for terrorism in the City is one year.

Appendix B

- The timeline for developing a plan for response for terrorism targets is two years.
- The timeline for working with the management of potential terrorism target facilities on planning and training is two years.

Ms. Habib identified potential mitigation strategies that the City of Sugar Land might pursue. Recommendations included:

- Developing an energy assurance plans; Ms. Habib will send information to Pat Hughes on a plan developed through the ComED power company
- Conducting flooding prevention training with local communities
- Conducting community preparedness training including forming a Community Emergency Response Team (CERT)
- Updating the local database of hazardous materials
- Updating the 911 system
- Conducting preparedness planning with local school districts, such as bulletproof glass, security systems, and safe rooms
- Conducting preparedness planning with local hospitals, such as enhancing security systems and installing picture identification systems
- Identifying transportation projects, such as building of bridges where needed
- Enhancing geographic information systems (GIS) technologies

Action Items/Assignments

- SAIC update the risk and vulnerability assessment based on the discussion from the meeting.
- Mr. Hughes will check with the Engineering Department to provide a timeline and potential funding sources for projects they identified and check on the timeline and funding sources for the debris management strategy.
- Ms. Habib will send information to Pat Hughes on a plan developed through COMED.
- SAIC will begin development of the City of Sugar Land Hazard Mitigation Plan.

Next Meeting

The date of the next public meeting has been tentatively set for July 25, 2013. The purpose of this meeting will be to review the draft Hazard Mitigation Plan.

**City of Sugar Land, Texas
Hazard Mitigation Plan Project
Kickoff Meeting/Public Meeting #3 Summary**

August 29, 2013

Purpose

The purpose of the meeting was to review the draft hazard mitigation plan (HMP) and discuss hazard rankings, review mitigation strategies, and collect the information needed to complete the HMP.

Meeting Attendees

Name	Organization	Position	Phone Number	E-mail
Dionne Bryant	City of Sugar Land GIS/IT	GIS Specialist	281-275-2709	dbryant@sugarlandtx.gov
Tamara Habib	Science Applications International Corporation (SAIC)	Consultant	312-848-4318	tamara.a.habib@saic.com
Kip L. Hilgers	City of Sugar Land Fire Department	Captain	281-275-2174	klh@sugarlandtx.gov
Pat Hughes	City of Sugar Land Emergency Management	Director/Emergency Management Coordinator	281-275- 2875	phughes@sugarlandtx.gov
Stuart Denton	City of Sugar Land Police Department	Captain	281-275-2500	sdenton@sugarlandtx.gov
Lisa Kocich-Meyer	City of Sugar Land Transportation and Long Range Planning	Principal Planner	281-275-2311	lmk@sugarlandtx.gov
Pat Pollicoff	City of Sugar Land Communications	Director	281-275-2238	ppollicoff@sugarlandtx.gov
David Rider	Fort Bend County Independent School District	Chief of Police	281-634-5501	David.rider@fortbendisd.com
Brian Rutherford	SAIC	Consultant	281-414-6741	brian.p.rutherford@saic.gov
Sharon Shapiro	City of Sugar Land Emergency Management	Executive Secretary	281-275-2310	sshapiro@sugarlandtx.gov
Doug Schomburg	City of Sugar Land Planning and Code Services	Director	281-275-2738	dschomburg@sugarlandtx.gov

Host: Pat Hughes, Emergency Management Coordinator, City of Sugar Land

Consultants: Brian Rutherford and Tamara Habib, SAIC

Handouts: Presentation slides, draft HMP, meeting agenda

Overview of Activities

WELCOME AND INTRODUCTIONS

Ms. Tamara Habib opened the meeting by welcoming attendees and sharing the agenda:

- Introductions
- Overview of Planning Process
- HMP Overview
 - ✓ Purpose
 - ✓ Community Profile
 - ✓ Risk and Vulnerability Assessment Ranking
 - ✓ Mitigation Strategy Changes
 - ✓ Mitigation Strategy Ranking
- Next Steps
- Questions and Answers
- Adjourn

Below is a summary of the key discussion points in the presentation. The full presentation is available through the City of Sugar Land.

OVERVIEW OF PLANNING PROCESS

Ms. Habib provided a brief overview of the planning process. She explained the importance of hazard mitigation planning, including the following:

- Required under the Disaster Mitigation Act of 2000
- Future federal funding is contingent upon having an HMP (note: an exception is granted if the jurisdiction is actively developing a plan)
- Guides post-disaster recovery
- Engages multiple community stakeholders
- Promotes public participation
- Evaluates hazards and risks
- Builds support for mitigation activities
- Helps educate community officials and the public
- Develops more effective community policies

Ms. Habib described the benefits of an HMP:

- Reduces vulnerability to future hazards
- Saves lives and property
- Facilitates pre- and post-disaster funding

- Speeds recovery
- Maintains economic stability

Ms. Habib then briefly discussed the process involved in plan development and identified that we are in the third phase of the four-phase process. The third phase involves constructing the draft HMP. The fourth phase will involve the finalization of the plan.

Ms. Habib described the purpose of hazard mitigation planning:

- Ensure compliance with federal and state mitigation policies.
- Harden Sugar Land against the effects of disasters.
- Reduce loss of life and property in the event of a disaster.
- Bring awareness to hazards faced by Sugar Land residents.

COMMUNITY PROFILE

After the project overview, Ms. Habib began a review of the draft HMP by first reviewing the Community Profile section of the plan. The Community Profile section provides information about the City of Sugar Land, including population, growth rate, watersheds, land use, and transportation.

In regard to transportation, meeting participants stated that railroad companies are in the process of adding additional railroad tracks (or double-tracking) the railways to double the capacity of railroads to transport materials. This could have the potential to increase the opportunity for hazardous materials spills in the City of Sugar Land. The double-tracking will be noted in the HMP.

Plans for land annexation were also discussed. Information regarding the extraterritorial jurisdiction will be included in the HMP.

Ms. Habib briefly discussed the effects of climate change on the City of Sugar Land. Climate change is not currently a Federal Emergency Management Agency (FEMA) requirement for HMPs. However, it is expected to be a requirement in the near future so climate change information was included in the plan.

Ms. Habib also discussed the capabilities of Sugar Land to support mitigation activities as identified in the plan. Capabilities of Sugar Land to support hazard mitigation activities were clarified in regard to staffing, fiscal, legal, regulatory, administrative, and technical capabilities.

In addition, Ms. Habib identified the need for the City of Sugar Land to supply SAIC with the value of the critical structures listed in the plans. It was also discussed that the structure value of Fort Bend County and Lamar Independent School District (ISD) facilities located within the City of Sugar Land also be supplied to SAIC for inclusion in the plan.

FIGURES

Ms. Habib discussed the extensive use of figures used in the HMP to illustrate land use and the distribution of population in the City of Sugar Land. Most of the figures used in the HMP were supplied by GIS staff within the City of Sugar Land IT Department. The figures provide information regarding:

- Current zoning and land use

Appendix B

- Future land use
- Watersheds
- Critical facility location
- Transportation maps
- Government boundaries

In reviewing the figures, it was noted that some of the committee members' names in figure 3-1 need to be corrected. It was also noted that the Sugar Land Boundary Map, figure 2-31, can be deleted as it is already displayed earlier in the plan.

PLANNING PROCESS AND PROJECT TIME LINE

Ms Habib reviewed the process used in planning and the project time line. The tasks associated with the HMP development and approval process were outlined in the chart below.

Date	Task
April 3, 2013	Kickoff meeting and public meeting of mitigation process
June 17, 2013	Draft risk assessment and mitigation strategies developed
June 20, 2013	Public meeting #2
August 2, 2013	Final mitigation strategy and risk assessment
August 29, 2013	Public meeting #3
September 2013	Draft updated HMP with changes required from public meeting for submittal to Texas Division of Emergency Management and FEMA for official review
October 2013	State review period
November 2013	FEMA review period
December 2013	Final draft updated plan based on State of Texas and FEMA recommendations
January 2014	Final approval obtained from jurisdictions and forwarded to FEMA

It was also noted in the discussion that state and FEMA reviews can often take longer than anticipated, resulting in delays in plan finalization.

RISK AND VULNERABILITY ASSESSMENT

Ms. Habib led the group through a review of the risk and vulnerabilities included in the plan. The hazards were listed in order of greatest to least risk to the City. The group was asked to review the list to determine if they agreed with the order of the hazards. In the course of discussion, the group decided to swap the position of hazardous materials with that of terrorism, thereby giving hazardous materials a higher ranking than terrorism. The group also decided to change the warning time associated with flooding from a 1, indicating a warning time of more than 12

hours, to a warning time of 3, indicating a 3 to 6 hours of warning time. This will have the effect of making flooding one of the highest ranked hazards for the City of Sugar Land.

HAZARD MITIGATION STRATEGIES

Ms. Habib discussed the hazard mitigation strategies identified in the HMP. She mentioned that hazard mitigation projects identified by the Fort Bend County ISD were added to the list. Ms. Habib then tasked the group with deciding how the hazard mitigation strategies should be ranked in the HMP. The choices for ranking the strategies included cost benefit, hazard ranking, or individual selection. After a brief discussion, the group decided to rank the hazard mitigation strategies by hazard ranking.

PLAN IMPLEMENTATION AND MAINTENANCE

Ms. Habib identified the Sugar Land Department of Emergency Management as responsible for ensuring implementation of specific mitigation actions as prescribed in the mitigation strategies. The Hazard Mitigation Planning Committee will be tasked with reconvening annually to ensure that projects are on track and to reevaluate the mitigation goals, objectives, and action steps. Lastly, public participation must be sought throughout the implementation, evaluation, and maintenance of the HMP.

ACTION ITEMS/ASSIGNMENTS

- SAIC will make corrections to the HMP as discussed in the meeting.
- David Rider with Fort Bend County ISD Police will collect information regarding facility structure values for Fort Bend County ISD facilities located within the City of Sugar Land.
- Lisa Kocich-Meyer will provide information to SAIC regarding City demographics, land use, and rail.
- Upon completion, SAIC will coordinate with the City of Sugar Land to submit the HMP to the State of Texas for review.

Appendix B

City of Sugar Land Hazard Mitigation Planning Project Kickoff/Public Meeting #1 Sign-in Sheet April 3, 2013

Name	Department	Position	Phone	E-mail
Pat Hughes	Emergency Management	Director / EOC	281-275-2238	phughes@sugarlandtx.gov
Frank Garcia	Emergency Management	EOC Specialist	281-275-2238	fgarcia@sugarlandtx.gov
John Nelson			832-459-3120	john@flatline.com
Michael Gethard	Armed Guard	President	713-213-5080	Michael@ArmedGuard.com
David Adolph	Communications	Asst Comm. Dir	272-11	dadolph@sugarlandtx.com
Stuart Denton	P.D.	P.C.T.	281-275-2500	sdenton@sugarlandtx.gov
Bruce McFarland	Nalco	SH&E Superintendent	281-263-7845	bruce.farland@neco.com
Terrie Bryant	GIS/IT	GIS Specialist	2709	tbryant@sugarlandtx.gov
Lisa Kuchmayer	TRIP	Plan Planner	281-275-2311	lkuchm@sugarlandtx.gov
Pat Bollicoff	Communications	Director	281-275-2238	pbollicoff@sugarlandtx.gov
Howard Christian	Utilities	Asst Director	281-275-2456	hchristian@sugarlandtx.gov
Stephanie Russell	Public Works	Admin. Manager	281-275-2480	srussell@sugarlandtx.gov
Kip Chlagers	FIRE	Captain	281-222-1040	KCH@SOSfire.com
Joe Anzures	EMS/Health	Asst Director / EOC	281-275-2520	joan@unitedway.org
Caroline Egan	Fort Bend Co. O&M	Planning Coordinator	281-342-6185	caroline.egan@fort-bend.tx.us
David Schramberg	Planning & Env. Services	Director	281-275-2738	dschramberg@sugarlandtx.gov
Rob Valenzuela	ENG	Asst. City Eng	281-275-2700	rvalenzuela@sugarlandtx.gov

Name	Signature	Email
Tommy Fink	[Signature]	dfink@segarlandtx.gov
Lisa Kovich-Mayer	[Signature]	lmk@segarlandtx.gov
Shirley Denton	[Signature]	sdenton@segarlandtx.gov
Pat Hughes	[Signature]	phughes@segarlandtx.gov
Pat Pollicoff	[Signature]	ppollicoff@segarlandtx.gov
Douglas Schaub	[Signature]	dschaub@segarlandtx.gov

City of Sugar Land Hazard Mitigation Plan | November 2014

Name	Department	Position	Phone	E-mail
John Hughes	FM	FMC	281-275-2840	John.Hughes@usgoatry.org
Kyle Hanks	FM	ADMIN	281-275-2774	Kyle.Hanks@usgoatry.org
Douglas Schenck	Planning (Ad Serv)	Director	281-275-2778	douglas.schenck@usgoatry.org
Pat McElroy	Communications	Director	281-275-2838	Pat.McElroy@usgoatry.org
James E. Smith	IT	GIS Specialist	281-275-2769	James.E.Smith@usgoatry.org
David Rindel	FBISD Police	Chief	281-634-5501	David.Rindel@fbisdsd.com
CONTRACTOR	FD	CART	2506	514010106@usgoatry.org
Lisa Kouchi-Meyer	TLRP	Principal Planner	281-275-2311	lmk@usgoatry.org
David Stevens	Local Area	Area Coordinator	281-275-2772	David.Stevens@usgoatry.org

For God so loved the world that he gave
his only begotten Son, that whosoever
believeth in him should not perish,
but have everlasting life. (John 3:16)
www.freebibleliterature.com



Seshadri Kumar
Publisher & Editor
www.fbindependent.com
Email: Editor@fbindependent.com

NOTICE OF CONSTABLES SALE
THE STATE OF TEXAS
COUNTY OF FORT BEND
By virtue of an Order of Sale issued out of the Honorable 434TH DISTRICT COURT of FORT BEND County on the 19th day of February 2013 by the Clerk thereof, in the case of FORT BEND COUNTY VS. WEBSTER M. SLAUGHTER AKA WEBSTER MELVIN SLAUGHTER, JR. ET AL in Cause # 12-DCV-199125 and to me, as CONSTABLE directed and delivered, I will proceed to sell, at 10:00 O'Clock AM on the 2nd day of April, 2013, which is the first Tuesday of said month, at the Fort Bend County Justice Center Parking Garage, 14118 Eugene Heimann Circle, Richmond, Texas, Level 1 of the Courthouse of said FORT BEND County, in the City of RICHMOND, Texas, the following described property, to wit:
TRACT 1: GEO: 8130510030070907 Lot Seven (7), Block Three (3) of Sienna Steep Bank Village, Section 5-A, an addition in Fort Bend County, Texas, according to the map or plat thereof, recorded in Slide Nols. 2268/B and 2269/A of the Plat Records of Fort Bend County, Texas.

Levied on the 8th day of March 2013 as the property of WEBSTER M. SLAUGHTER, AKA WEBSTER MELVIN SLAUGHTER, JR. to satisfy a judgment amounting to \$16,095.55, representing delinquent taxes, penalties, interest, and attorney's fees through the date of judgment, plus all costs of court costs of sale, and post judgment penalties and interest recoverable by law in favor of FORT BEND INDEPENDENT SCHOOL DISTRICT; SIENNA PLANTATION LEVEE IMPROVEMENT DISTRICT; SIENNA PLANTATION MUNICIPAL UTILITY DISTRICT # 2, FORT BEND COUNTY, FORT BEND COUNTY DRAINAGE DISTRICT, FORT BEND COUNTY GENERAL FUND.
ALL BIDDERS MUST COMPLY WITH SECTION 34.015 OF THE TEXAS PROPERTY TAX CODE.
GIVEN UNDER MY HAND THIS 8th day of March 2013
Rob Cook, Constable
Fort Bend County, Texas
By: Sergeant S.D. Sayers
Deputy Constable #1309

PUBLIC HEARING NOTICE
The Commissioners Court of Fort Bend County, Texas has set a public hearing at 1:00 p.m. on Tuesday, April 9, 2013 for the receipt and extension of Fort Bend County Municipal Utility District 3B Wastewater Treatment Plant No. 1, Replat and Ext. 1, Precinct 3. The hearing will be held in the Commissioners Courtroom, William B. Travis Bldg., 309 S. Fourth St., 7th, 700, Richmond, Texas. Under state law, you the owners, have certain rights with respect to the proposed replat. Should you wish to exercise your rights, you may be heard at the planned public hearing. You may contact Ralph Lopez with Brown & Gay Engineers Inc. at 281-558-8700 for information prior to the hearing.
Submitted by:
Dianne Wilson
Fort Bend County Clerk

NOTICE OF CONSTABLE SALE
REAL PROPERTY
Under and by virtue of a Writ of Execution and / or Order of Sale issued on the 5th day of February, 2013 by the 400th Judicial District Court of Fort Bend County, Texas in cause # 10-DCV-180975 in favor of the Plaintiff - Mission West Civic Improvement Association, for the sum of \$7,056.61 +++++costs as taxed on said Execution and / or Order of Sale and further the sum of executing the same. Therefore, on the 19th day of February, 2013, I, Constable Rob Cook of Precinct Three Fort Bend County, Texas, have levied on and have seized all rights title, interest, and claim to which the said Defendant(s) - Anastacio Lopez and Sam Lopez had of, in or to the following described real property, and will offer for sale on the 2nd day of April, 2013 at the County Courthouse steps of Fort Bend County, Texas in the City of Richmond, Texas between the hours of 10:00 a.m. and four o'clock p.m. and all

NOTICE OF CONSTABLES SALE
THE STATE OF TEXAS
COUNTY OF FORT BEND
Under and by virtue of a Writ of Execution and / or Order of Sale issued on the 7th day of February, 2013 by the 434th Judicial District Court of Fort Bend County, Texas in cause # 11-DCV-120995 in favor of the Plaintiff - Mission West Civic Improvement Association Plaintiff, for the sum of \$5,972.46 +++++costs as taxed on said Execution and / or Order of Sale and further the sum of executing the same. Therefore, on the 21st day of February, 2013, I, Constable Rob Cook of Precinct Three Fort Bend County, Texas, have levied on and have seized all rights title, interest, and claim to which the said Defendant(s) - Anastacio Lopez and Sam Lopez had of, in or to the following described real property, and will offer for sale on the 2nd day of April, 2013 at the County Courthouse steps of Fort Bend County, Texas in the City of Richmond, Texas between the hours of 10:00 a.m. and four o'clock p.m. and all

NOTICE OF CONSTABLES SALE

THE STATE OF TEXAS
COUNTY OF FORT BEND
By virtue of an Order of Sale issued out of the Honorable 434TH DISTRICT COURT of FORT BEND County on the 20th day of February 2013 by the Clerk thereof, in the case of FORT BEND COUNTY VS. WEBSTER M. SLAUGHTER AKA WEBSTER MELVIN SLAUGHTER, JR. ET AL in Cause # 12-DCV-199125 and to me, as CONSTABLE directed and delivered, I will proceed to sell, at 10:00 O'Clock AM on the 2nd day of April, 2013, which is the first Tuesday of said month, at the Fort Bend County Justice Center Parking Garage, 14118 Eugene Heimann Circle, Richmond, Texas, Level 1 of the Courthouse of said FORT BEND County, in the City of RICHMOND, Texas, the following described property, to wit:
TRACT 1: GEO: 8130510030070907 Lot Seven (7), Block Three (3) of Sienna Steep Bank Village, Section 5-A, an addition in Fort Bend County, Texas, according to the map or plat thereof, recorded in Slide Nols. 2268/B and 2269/A of the Plat Records of Fort Bend County, Texas.

NOTICE OF CONSTABLES SALE

THE STATE OF TEXAS
COUNTY OF FORT BEND
By virtue of an Order of Sale issued out of the Honorable 268TH DISTRICT COURT of FORT BEND County on the 19th day of February 2013 by the Clerk thereof, in the case of FORT BEND COUNTY VS. CHERYL KAY SCHWAMMURG # 04-DCV-140342 and 11-DCV-191454 and to me, as CONSTABLE directed and delivered, I will proceed to sell, at 10:00 O'Clock AM on the 2nd day of April, 2013, which is the first Tuesday of said month, at the Fort Bend County Justice Center

PUBLIC NOTICE OF TEST OF AUTOMATIC TABULATING EQUIPMENT

AVISO PUBLICO DE PROBAR EL EQUIPO TABULAR AUTOMATICA

Notice is hereby given that the automatic tabulating equipment that will be used in the election to be held on May 11, 2013, will be tested on April 4, 2013 at 10:00 a.m. at the Fort Bend County Elections Department, 4520 Reading Road, Rosenberg Texas to ascertain that it will accurately count the votes cast for all offices and on all measures.

Por lo presente se da aviso que al equipo para tabular automáticamente que se usará en la elección el 11 de Mayo del 2013 se probará el 4 de Abril del 2013 a las 10:00 a.m. en el Departamento de Elecciones del Condado de Fort Bend, 4520 Reading Road, Rosenberg Texas para determinar si el equipo contará con exactitud los votos para todos los puestos oficiales y sobre todos los proyectos de ley.

/s/ John Oldham
Fort Bend County Elections Administrator
Administrador de Elecciones del Condado de Fort Bend



NOTICE OF PUBLIC MEETING

THE PURPOSE OF HAZARD MITIGATION IS TO IMPLEMENT AND SUSTAIN SHORT AND LONG TERM STRATEGIES THAT REDUCE OUR VULNERABILITY FROM HAZARDS LIKE HURRICANES, FLOODING AND OTHER DISASTERS. THIS IS THE NOTICE OF THE PUBLIC MEETING THAT IS PART OF THAT PROCESS

PURPOSE: A public meeting shall be held at which all persons interested shall be given an opportunity to be heard

WHERE:
CITY OF SUGAR LAND CITY HALL
CANE ROOM
2700 TOWN CENTER BOULEVARD NORTH
SUGAR LAND, TEXAS

WHEN:
WEDNESDAY, APRIL 3, 2013
5:00 P.M. TO 7:00 P.M.

THE CITY OF SUGAR LAND PLAN WILL IDENTIFY IMPORTANT PARTNERSHIPS TO ENSURE ALL STAKEHOLDERS SHARE IN THE DECISION-MAKING PROCESS AND IMPLEMENTATION OF ACTIONS BEFORE, DURING AND AFTER DISASTERS. OUR GOAL IS TO PROTECT LIVES AND PROPERTY AS WELL AS REDUCE THE FINANCIAL IMPACT OF FUTURE DISASTERS.

SUGAR LAND EMERGENCY MANAGEMENT WILL HOST THREE PUBLIC MEETINGS. RESIDENTS UNABLE TO ATTEND THE PUBLIC MEETINGS MAY PROVIDE ONLINE INPUT THROUGH ONLINE TOWN HALL AT WWW.SUGARLANDTX.GOV.



NOTICE TO BIDDERS

SUGAR LAKES RAW WATER SUPPLY PUMP STATION

The City of Sugar Land seeks bids for furnishing all labor, material, and equipment, and performing all work required for the following project in the City:

Texana receives new funding

Texana Center was recently informed that the center has been successful in its application for funding of special projects through the new Texas Healthcare Transformation and Quality Improvement Program, commonly known as the "1115 Medicaid Waiver." This waiver allows community centers like Texana Center, public hospitals, counties and academic institutions to develop programs designed to improve access to healthcare and improve the quality of healthcare.

Texas submitted five proposals all of which were approved:

- To provide specialized behavioral healthcare services to the complex behavioral health population of children with diagnoses of autism spectrum disorders and related conditions
 - To implement a system of early identification and delivery of therapeutic services for children with developmental delays
 - To develop an 8 bed 48-hour extended observation unit and a 14 bed crisis residential unit designed to provide intervention and to keep individuals in crisis out of emergency rooms and/or jails
 - To create a crisis behavioral healthcare team to keep individuals in crisis out of state supported living centers, emergency rooms, state mental hospitals, and/or jail
 - To provide specialized behavioral healthcare services to the complex behavioral health population of children with diagnoses of autism spectrum disorders and related conditions
- The 1115 Waiver is a five year initiative, which Texas anticipates will most likely be renewed

Funding for the projects listed above represents almost \$15 million over the first three years of the waiver. However, in order to draw down the funds, each project must achieve set outcomes which were included as part of each project's plan.

George Patterson, C.E.O. commented "This is a real opportunity for Texana to provide care in our community that was much needed but which our current funding sources could not provide. Over the next few months Texana will be hiring an excess of 100 new staff to implement these programs. We believe these programs will most certainly improve the delivery of care in the areas we serve."



NOTICE OF PUBLIC MEETING

THE PURPOSE OF HAZARD MITIGATION IS TO IMPLEMENT AND SUSTAIN SHORT AND LONG TERM STRATEGIES THAT REDUCE OUR VULNERABILITY FROM HAZARDS LIKE HURRICANES, FLOODING AND OTHER DISASTERS. THIS IS THE NOTICE OF THE PUBLIC MEETING THAT IS PART OF THAT PROCESS.

PURPOSE: A PUBLIC MEETING SHALL BE HELD AT WHICH ALL PERSONS INTERESTED SHALL BE GIVEN AN OPPORTUNITY TO BE HEARD

WHERE: CITY OF SUGAR LAND CITY HALL
CANE ROOM
2700 TOWN CENTER BOULEVARD NORTH
SUGAR LAND, TEXAS

AUTOMOBILE: Nissan Sentra

By BARBARA FULENWIDER
The all-new 2013 Nissan Sentra saves up to 150 pounds, is powered by a new 1.8-liter engine and next-generation Xtronic CVT® with sub-planetary gear for optimal performance and efficiency and boasts a best-in-class combined fuel economy of 34 mpg. The engine is rated at 130 horsepower and 128 lb-ft of torque.

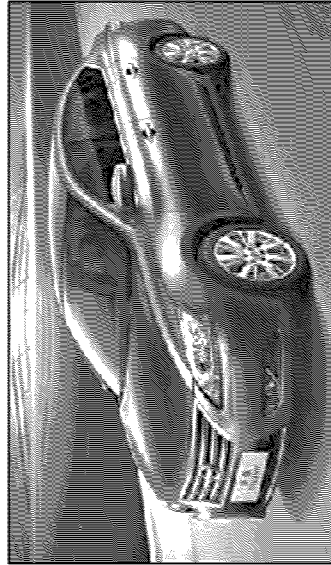
Also new for the 2013 Sentra is the optional NissanConnectSM with Navigation. It features hands-free text messaging assistant, POIs powered by Google™ and Google™ send-to-car functions.

The redesign of Sentra focuses on design standards inside and out, as well as efficiency in engineering. The new Sentra is five percent lighter than the previous model, yet has slightly larger overall dimensions and more interior room.

All CVT models achieve a best-in-class EPA rated 34 mpg combined (city and highway) and a more than 415-mile driving range. Sentra's all-new design adopts Nissan's trapezoid-shaped grille and large wraparound headlights with LED accents — the

[illegible]

3:30 PM



ment to offer them as standard equipment.

For 2013 Sentra's beltline has been lowered and a new character line has been added that runs from the front fender, along the sides, and finishes at the sculpted taillights and trunklid, giving the new Sentra a more aggressive stance and enhanced outward visibility for passengers. Other exterior features include chrome door handles and chrome window accents, available heated outside mirrors with integrated turn signals, and available sport front and rear fascias and spoiler.

Inside, the rear seat is a standard 60/40 split fold-down design, offering access to the 15.1 cubic feet of trunk space (2.0 cubic feet larger than the 2012 Sentra's trunk). Standard interior features include a six-way manual driver's seat, four-way manual front passenger's seat, front and rear door pockets, front center console, air conditioning with in-cabin

CITATION BY PUBLICATION
DIVORCE

TO: Ricardo Santos, Unknown and to all whom it may concern, Respondent

You have been sued. You may employ an attorney. If you or your attorney do not file a written answer with the clerk who issued this citation by 1:00 PM on the Monday next following the expiration of twenty (20) days after you were served this citation and petition, a default judgment may be taken against you. **THE ORIGINAL PETITION**

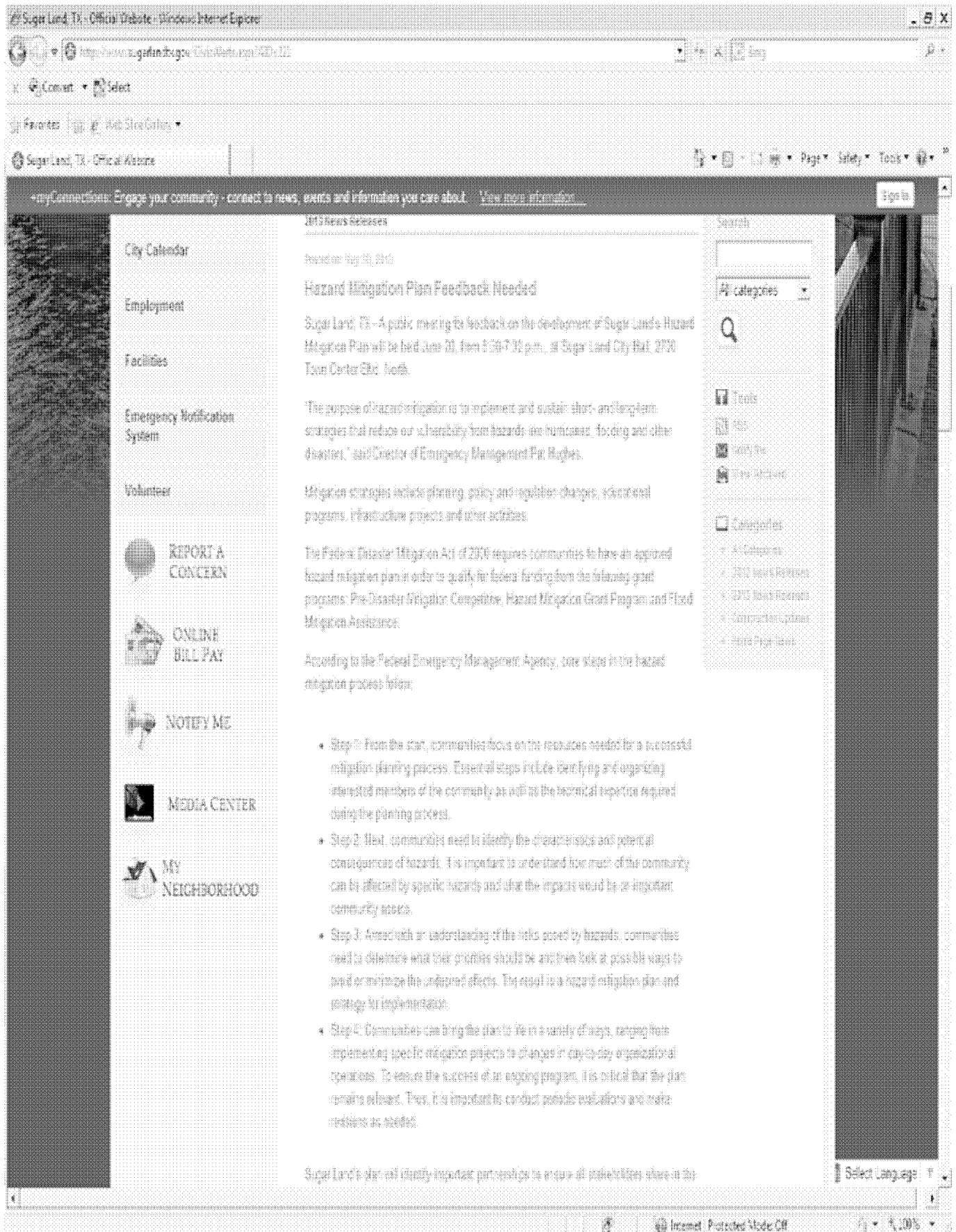
The system also offers entertainment options such as Pandora radio capability, Streaming Audio via Bluetooth. The 5.8-inch touch-screen display makes maps and other information easier to read, especially when paired with NavTraffic and NavWeather functions (SiriusXM subscription required), along with POIs powered by Google™ and Google™ Send-to-Car functions. The navigation's map views feature warnings for curves and speed limit information.

Other available technology includes a rearview monitor, illuminated push button ignition and tire pressure monitoring system with easy fill tire alert feature. If air is being added or removed from a tire, the system signals the user when the recommended tire pressure has been reached by sounding the horn.

The new Sentra also features an independent strut front suspension with stabilizer bar, torsion beam rear axle with integrated stabilizer bar, power-assisted vented front disc rear drum braking system (four-wheel disc brakes are available), and vehicle speed-sensitive electric power steering. Available wheels and tires include 16-inch steel wheels or 17-inch aluminum alloy wheels.

The 2013 Nissan Sentra is offered in a selection of six trim levels: S, FE+ S, SV, FE+ SV, SR and SL. All trims come with standard Xtronic CVT®, except the base Sentra S that is available with a choice of six-speed manual transmission or CVT.

The Sentra SL retails for \$19,760 with all standard equipment. The Sentra is a smartly fun car to drive. It also



Sugar Land's plan will identify important partnerships to ensure all stakeholders share in the decision-making process and implementation of actions before, during and after disasters.

"Our goal is to protect lives and property, as well as reduce the financial impact of future disasters," said Hughes. "Public participation is an important part of this process."

Sugar Land Emergency Management will host this second of three public meetings. Residents unable to attend the public meetings may provide online input through Online Town Hall at www.sugarlandtx.gov/onlinetownhall.

2013 News Releases

Posted on: August 5, 2013

Hazard Mitigation Plan Feedback Needed

Sugar Land, TX - A public meeting for feedback on the development of Sugar Land's Hazard Mitigation Plan will be held Aug. 29, from 5:30-7:30 p.m., at Sugar Land City Hall, 2700 Town Center Blvd. North.

"The purpose of hazard mitigation is to implement and sustain short- and long-term strategies that reduce our vulnerability from hazards like hurricanes, flooding and other disasters," said Director of Emergency Management Pat Hughes.

Mitigation strategies include planning, policy and regulation changes, educational programs, infrastructure projects and other activities.

The Federal Disaster Mitigation Act of 2000 requires communities to have an approved hazard mitigation plan in order to qualify for federal funding from the following grant programs: Pre-Disaster Mitigation Competitive, Hazard Mitigation Grant Program and Flood Mitigation Assistance.

According to the Federal Emergency Management Agency, core steps in the hazard mitigation process follow:

- Step 1: From the start, communities focus on the resources needed for a successful mitigation planning process. Essential steps include identifying and organizing interested members of the community as well as the technical expertise required during the planning process.
- Step 2: Next, communities need to identify the characteristics and potential consequences of hazards. It is important to understand how much of the community can be affected by specific hazards and what the impacts would be on important community assets.
- Step 3: Armed with an understanding of the risks posed by hazards, communities need to determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a hazard mitigation plan and strategy for implementation.
- Step 4: Communities can bring the plan to life in a variety of ways, ranging from implementing specific mitigation projects to changes in day-to-day organizational operations. To ensure the success of an ongoing program, it is critical that the plan remains relevant. Thus, it is important to conduct periodic evaluations and make revisions as needed.

Sugar Land's plan will identify important partnerships to ensure all stakeholders share in the decision-making process and implementation of actions before, during and after disasters.

"Our goal is to protect lives and property, as well as reduce the financial impact of future disasters," said Hughes "Public participation is an important part of this process."

Sugar Land Emergency Management will host final public meeting. Residents unable to attend the public meetings may provide online input through Online Town Hall at <http://www.sugarlandtx.gov/online-townhall>.

Appendix C

SPECIAL HAZARD EVENTS LIST DATABASE FOR THE UNITED STATES FREQUENTLY ASKED QUESTIONS

1. Why do I have a different number of counties from decade to decade?

This is caused by changes in county boundaries. The changes are documented in the metadata and are the following.

1960: There were 3,068 counties, 30 independent cities in Virginia, and the independent cities of Baltimore and St. Louis for a total of 3,100 enumeration units.

1970: There were 3,067 counties (Princess Ann County, VA was absorbed by Virginia Beach city in 1963; Menominee County, WI was carved out of Shawano County, WI in 1961), 38 independent cities in Virginia (Salem/51775 became independent of Roanoke/51161 in 1968; Bedford City/51515 became independent of Bedford County/51019 in 1968; Emporia became independent of Greensville County/51081 in 1967; Lexington/51678 became independent of Rockbridge County/51153 in 1965; Fairfax/51600 became independent of Fairfax County/51059 in 1961; Arlington was a county in 1960 but changed status to an independent city in 1970), and the independent cities of Baltimore, St. Louis, and Carson City (Ormsby, NV was consolidated with Carson City/32510 in 1969).

1980: There were 3,065 counties (Washabaugh, SD/46131 merged with Jackson, SD/46071 in 1979; City of Nansemond, VA became Nansemond County in 1972, then merged with the City of Suffolk, VA in 1974). 41 independent cities in Virginia (Poquoson/51735 became independent of York County/51199 in 1976), and the independent cities of Baltimore, St. Louis, and Carson City.

1990: There were 3,067 counties (La Paz, AZ/04012 was formed from part of Yuma County, AZ in 1982; Cibola, NM/35006 was formed from part of the western portion of Valencia County, NM in 1981), 41 independent cities of Virginia, and the independent cities of Baltimore, St. Louis, and Carson City.

2. Why do I only see 10 results on the web though it seems that my request should contain many more records?

The ten results displayed on the web represent the records with the highest property damage of your request. It is just an example of how the requested data will look when displayed as a spread sheet. The downloadable subset will include all records that match your search.

3. Why can't I find a certain event in the database?

The database only includes those events that generated more than \$50,000 in either crop or property damage between 1960 and 1995. If the event you are looking for generated less damage, you will not be able to locate it in this database. Sometimes, however, damage information was just not available from the utilized data sources even if the event caused high monetary losses. For information on the data sources, please see the metadata section.

Appendix C

Please consider, that the event may have affected several counties. Consequently, you need to locate all these counties by searching the database by date and hazard event in order to get a loss estimation for a certain event.

4. Will my request contain double records if I search for two or more different hazard types?

No, events composed of multiple hazard types will not be listed more than once in your data request. However, you will receive double, triple etc. records when querying the database separately for each hazard type. For instance, if you query the database for *Floods*, you will receive any record related to flooding. If you query the database again for a different hazard type such as *Severe Thunderstorms*, the database will not know that you would like to omit flood events based on your previous query. Instead, the database will return all thunderstorm-related events including combined thunderstorm and flood events. To avoid double records, please query the database simultaneously for all the hazard types that you are interested in.

5. What data sources have been used to compile the database?

The main data sources were "Storm Data and Unusual Weather Phenomena" by the National Climatic Data Center, information from the National Geophysical Data Center, and the Storm Prediction Center. Please see the metadata section for more detailed information.

6. Does the database contain information on Puerto Rico, Guam, or other U.S. territories?

No, the database refers to U.S. counties only.

7. What do the different columns of my downloaded .txt file represent?

The columns represent information on hazard events (beginning and ending), hazard type(s), spatial information (FIPS code, county, state, and sometimes additional local remarks), and damage information (crop and property damage, fatalities, injuries). Please see the metadata section for more detailed information.

Example: If you are searching for drought events in South Carolina between August 1, 1990 and August 1, 1995, the database will return an event that will be visualized on our website as following:

Begin Date	Hazard Type	State	County	Injuries	Fatalities	Property Damage	Crop Damage
05/01/1995	DROUGHT	SC	Abbeville	0.00	0.00	0.00	434782.61
TOTAL	--	--		0	0	0	20000000

The corresponding download file will come in a delimited text format (pipe or tab) including a header and looks the following: HAZARD ID | HAZARD_BEGIN_DATE | HAZARD_END_DATE | HAZARD_TYPE_COMBO | NAME | POSTAL_CODE | FIPS_CODE | FATALITIES | INJURIES | PROPERTY_DAMAGE | CROP_DAMAGE | LOCATION | REMARKS 96371 | 05/01/1995 | 05/31/1995 | Abbeville | SC | 45001 | 0.00 | 0.00 | 0.00 | 434782.61 | DROUGHT

SPECIAL HAZARD EVENTS LIST DATABASE FOR THE UNITED STATES FREQUENTLY ASKED QUESTIONS

8. Why can't I download the complete database?

Download restrictions are required due to limited server capacities. For more information contact the Hazards & Vulnerability Research Institute.

9. How can I map downloaded data?

The easiest way to map the downloaded information is by generating a spreadsheet depending on the software you are using (e.g. .dbf for ESRI ArcView and ArcGIS) and then linking it with spatial information through the FIPS code. Such spatial information may be already provided by your software package. However, by using such default data you won't be able to map data prior to 1982 as the number of counties is different. Spatial information (shapefiles) are available from our products section.

10. What does a record represent?

Each record from 1990 through 1995 refers to a hazard event affecting a county and generating total losses higher than \$50,000 of either property or crop damage. For instance, a thunderstorm event affecting Richland and Lexington County in South Carolina and causing property damages of \$50,000 will be entered in the database as an event affecting Richland County with \$25,000 and Lexington County with \$25,000 worth of damage. However, a thunderstorm event causing \$5,000 in Richland County alone will not be included as the damage does not exceed the threshold value of \$50,000.

Note, from 1960 to 1989 and 1995 on, every event listed in NCDC's storm data set that had exact damage figures assigned was entered into the database. This methodology modification was necessary as NCDC changed its reporting procedure in the course of 1995. Originally, NCDC had classified damages into logarithmic categories such as \$0-50, \$50-500, \$500-5000, \$50,000-500,000, \$5,000,000-50,000,000. In addition, the spatial resolution of the reports was low, i.e. most frequently damages were documented for larger regions instead of singular counties. In the course of 1995, NCDC started reporting exact dollar figures such as \$126,000 and the resolution increased as well, meaning damages were immediately assigned to a specific county if possible. Thus, many counties missed the \$50,000 threshold from 1995 through 2000. Major damages in a state would be lost had we maintained the threshold, hence the decision to adjust the methodology.

11. Why are there injuries and fatalities with decimal places?

Often casualties and damage information are listed without sufficient spatial reference. For instance, the damage caused by a singular natural hazard could be listed as:

Delaware (statewide) - January 20, 1988 - Snow Storm - 1 fatalities - 6 injuries - \$100,000 property damage

In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses need to be divided by the number of counties affected from this event. In the snow storm example provided above, the losses would be split between Delaware's three counties as the hazard had affected the whole state. Thus, the event would enter the database as:

Kent - January 20, 1988 - Snow Storm - 0.33 fatality - 2 injuries - \$33,333.33 property damage

New Castle - January 20, 1988 - Snow Storm - 0.33 fatality - 2 injuries - \$33,333.33 property damage

Sussex - January 20, 1988 - Snow Storm - 0.33 fatality - 2 injuries - \$33,333.33 property damage

12. Can I compare dollar losses across years?

Yes, our database now has a function that adjusts losses for inflation, allowing for comparability between years.

13. There are numerous cases where the damage figures are far less than \$50,000. Is this only due to the fact that damages have been divided based on the geography or have more specific sources been used?

The National Climate Data Center (NCDC) has changed its reporting procedures in 1995. During this year both categorical as well as exact dollar losses have been reported by NCDC. Thus, the majority of the records from 1995 onwards are exact damage figures that have been reported as such by NCDC and that have not undergone any processing by us (exemption: events affecting multiple counties).

In addition, NCDC has also improved its spatial reporting system. Instead of reporting affected regions and an associated damage figure that we would have distributed across the affected counties, NCDC has moved on to reporting every single county and its associated damage separately.

Thus from 1960-1989, we have included EVERY event that caused property or crop damages. This change in our methodology was necessary due to NCDC's change in reporting. Consequently, you will find many small damage figures like \$500, \$1000, etc. in these events.

Hence, from 1990 - 1995 we have only selected events with property or crop damage higher than \$50,000 (equals NCDC's logarithmic category 5=\$50,000 to \$500,000), whereas from 1995 onwards we have included all property or crop damage-causing events reported in NCDC's Storm Data publications.

14. Why can't I join the SHELDUST™ attribute table with a spatial table via FIPS codes?

The most likely reason for this problem is that the FIPS code columns are formatted differently. The SHELDUST™ FIPS code column is formatted as number.

15. What is a presidential disaster declaration?

FEMA issues numbers for presidential disaster declarations by state. For every state, FEMA lists so-called designated counties affected by the event. SHELDUST™ does not include all PDDs. SHELDUST™ includes only PDDs for selected major events. For more information on presidential disaster declarations see <http://www.fema.gov/news/disasters.fema>.

16. Why do losses in my county include coastal hazards when my county is not a coastal county?

Because of inaccuracies in the spatial identification of hazard events within NCDC Storm Data reports, there are instances within the SHELDUST™ database where inland counties will contain property and/or crop losses from coastal hazard events. This issue mainly occurs when an event is labeled as a “statewide” event by NCDC in which each county receives an equal percentage of

SPECIAL HAZARD EVENTS LIST DATABASE FOR THE UNITED STATES

FREQUENTLY ASKED QUESTIONS

losses irrespective of spatial location or hazard event type. Hence, a hazard event identified as “flooding, winter weather, coastal storm” which is given a statewide locational identifier is treated as an event which impacted each county equally. Therefore, inland counties may (at times) be attributed with events and losses that seem incapable of occurring.

17. How are coastal hazards defined?

Coastal hazards not specifically referencing a major event type (such as a hurricane or flood) sometimes fall into this more broad category. The coastal category can sometimes include losses pertaining to flooding, severe storm, or hurricane events but more often includes other coastal hazards referenced as high tide, rouge tide, erosion, high seas, heavy surf, etc. We advise users to look at coastal hazards for any events that may fall within either your temporal frame of interest or your hazard specific interest as additional losses from such events may be allocated to this category. For more information on hazards that are classified as coastal in SHELDUS please see this document:

18. How do you categorize data?

Generally, data is easily parsed into one of the HVRI 18 hazard categories based on the NCDC hazard classification. We do not change or modify the classifications created by NCDC but rather aggregate multiple hazard type classifications into a more broad hazard event class including the following event types: 1 - Avalanche 2 - Coastal 3 - Drought 4 - Earthquake 5 - Flooding 6 - Fog 7 - Hail 8 - Heat 9 - Hurricane/Tropical Storm 10 - Landslide 11 - Lightning 12 - Severe Storm/Thunder Storm 13 - Tornado 14 - Tsunami/Seiche 15 - Volcano 16 - Wildfire 17 - Wind 18 - Winter Weather.